The Hong Kong Joint Universities Summer Teaching Laboratory (JUSTL)

2007-2015

Marine Biological Laboratory (MBL), Woods Hole, MA, USA

Sarah E. Webb

Front cover images

Top Row (L-R):

Squid fresh off the collecting boat; a horseshoe crab in the Marine Resources Center; an African clawed frog (*Xenopus laevis*) from the National *Xenopus* Resource.

Middle Row (L-R):

The solutions and equipment prepared for an experiment in the JUSTL laboratory; the Rowe Laboratory building where the JUSTL laboratory was based; a starfish in the Marine Resources Center.

Bottom Row (L-R):

A sea urchin and small starfish in the Marine Resources Center; the Marine Biological Laboratory specimen collecting boat, Gemma; equipment in the JUSTL laboratory to measure the tension of the zebrafish chorion during hatching.

Contents

Forward

When I was invited to write this article about the ***Joint Universities Summer Teaching Laboratory (JUSTL),*** I was assigned to produce an article that celebrated the programme's achievements from the point of view of everybody involved, including the Director, Co-Directors, mentors and especially the participants.

I interviewed the JUSTL Director, Prof. Andrew L. Miller (Division of Life Science, HKUST) and contacted the JUSTL Co-Directors (Profs Robert Baker, Department of Neuroscience and Physiology, New York University Medical School and Karen Crawford, Department of Biology, St Mary's College of Maryland) as well as several of the mentors to get their views on the JUSTL participants and on the programme as a whole. However, I was most interested in contacting the JUSTL alumni to get their views about the programme.

I was involved in the organization of the programme here in Hong Kong from the start. I helped design the JUSTL web-site, and each year I designed the fliers we sent out to advertise the programme throughout the Hong Kong Universities. I also helped to interview potential participants, prepared the Annual Report and was involved in organizing the programme finances.

I also had the opportunity to visit the Marine Biological Laboratory (MBL) in Woods Hole (MA, USA) myself when I participated in the programme in 2012. I had an amazing time there working with Prof. Karen Crawford and attempting to inject squid embryos with the bioluminescent calcium ion reporter, aequorin. I also helped Prof. Andrew L Miller prepare a research article; helped to mentor one of the participants (Jeffrey Kelu); and of course attended a lot of the MBL course lectures. So while *I* found the experience to be very fulfilling, I wasn't sure about the other participants. For some people it was their first time outside Asia, and for nearly everyone it was the longest time that they had been away from their family and friends.

The internet is amazing when you want to find people! I used work e-mail address and social media platforms such as LinkedIn or Facebook Messenger to track down participants. Initially the response rate was very low but after a few gentle reminders in follow-up e-mails, most people replied to me and agreed to either be interviewed face-to-face or to answer my questions via e-mail. I was especially happy when people agreed for me to interview them directly, and I really enjoyed traveling about Hong Kong to visit them at their place of work. This was the first time that I had been to The Open University of Hong Kong in Ho Man Tin, to Tai Po Hospital, and to the beautiful campus of The Education University of Hong Kong in Tai Po. I also interviewed several people who live overseas, and in these cases we used Skype, FaceTime or WeChat to talk. You will see that in the end, I was able to write articles about 36 of the JUSTL alumni, and I hope that you can see that the main recurrent theme from all of them is how attending the JUSTL programme was a very positive experience. In some cases, it was the laboratory-based work that they found useful, either being taught a new technique or learning how to use a new piece of equipment, whereas for others it was a lecture or workshop that really inspired them, or the interaction they had with their mentors.

I hope that you find this review about the JUSTL programme interesting, and like me conclude that by all accounts it was a major success and helped a lot of young Hong Kong research scientists in their career. The programme was made possible by funding from the Hong Kong Croucher Foundation, with matching funds from the Government of the Hong Kong Special Administrative Region.

Sarah

September 2019

The Woods Hole Scientific Community

The small village of Woods Hole, located on the south-eastern tip of Cape Cod in Massachusetts, USA, is a world renowned centre for basic biological and biomedical research as well as marine and environmental research. This is because four major research institutions as well as various smaller science associations and laboratories are located in and around the village. The biggest research institutions include The Marine Biological Laboratory (MBL), Woods Hole Oceanographic Institution (WHOI), the National Marine Fisheries Service (NMFS) and the U.S. Geological Survey (USGS). The MBL and WHOI are private non-profit organizations whereas NMFS and USGS are both federal government facilities. These along with the Sea Education Association (SEA) and the Woods Hole Research Center (WHRC) constitute the Woods Hole Scientific Community, and together they comprise a world renowned centre for marine, environmental and biomedical research.

The Marine Biological Laboratory

The MBL was established in 1888. It was founded by scientists who believed that it would be more efficient to study some of the key processes in biology, such as neurobiology, cell and developmental biology, using simple marine animals than in more complex higher animals. Initially (and until the 1970s when a year-round programme was established) the MBL was only open during the summer months and scientists from all around the US and from other parts of the world would visit in June, July and August. They collected marine samples such as squid, horseshoe crabs and sea urchins, and ran experiments using them. Then, at the end of the summer, they'd pack up and head back to their home institutions. Today, the MBL is an international research centre affiliated with the University of Chicago, and the scientists who work there are mainly involved in basic research in biology, environmental science and biomedicine, and they still use simple marine models to investigate various aspects of human health and disease.

Each year, the MBL offers a broad range of courses and workshops during the summer months. When the courses were first introduced they were initially designed for training teachers how to teach biology. However, over the years, these programmes have evolved and now they are recognised as being some of the best you can take as a young scientist in order to develop and further your career in biosciences. The course directors and faculty are selected from leading universities and research institutions from all over the globe and are recognised experts in their particular field. The courses comprise a practical, laboratory-based component and a lecture-based component, and although the practical sessions are only open to those researchers who have been accepted on the course, the lectures are open to everybody. There are a wide range of Advanced Research courses provided by the MBL each year, but the main three, which run for several weeks each summer are the *Embryology: Concepts and Techniques in Modern Developmental Biology* course, the *Physiology: Modern Cell Biology Using Microscopic, Biochemical and Computational Approaches* course, and the *Neurobiology: Mechanisms and Advanced Approaches* course. Being accepted on these courses, however, is quite difficult as only a limited number of students are accepted each year. For example, the *Neurobiology* course only takes 12 students, whereas the *Embryology* and *Physiology* courses each take 24 students. For those who do get accepted on one of the courses, then mornings are spent in the lecture theatre with some of the top researchers in the field, and the afternoons and evenings are spent in the laboratories learning new techniques, and using the most modern and best equipment possible. This is because the manufacturers of the equipment like to lend it to the MBL so that the students can use it during the summer, then when they become independent scientists then there is a very good chance that they might buy the equipment that they used during the course.

The Woods Hole Oceanographic Institution

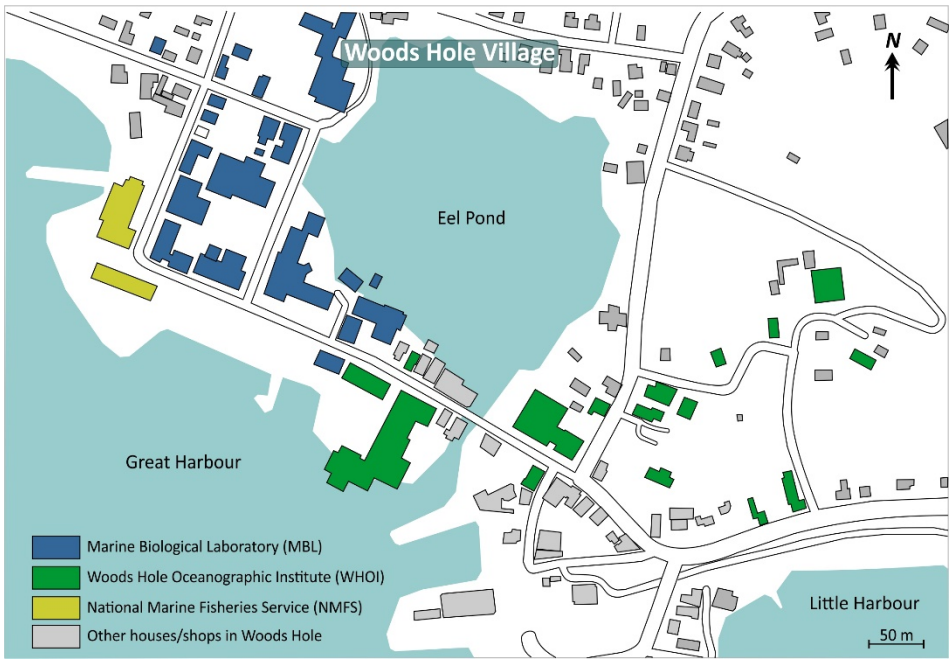
WHOI is a private, non-profit research and higher education centre, which was established in 1930 and its main focus has always been the study of all aspects of oceanography, including marine science and engineering. As a lot of the research conducted at WHOI was (and still is) conducted underwater, a number of highly sophisticated submergence research vessels have been built there. Perhaps the most famous of these is Human Occupied Vehicle (HOV) *Alvin*, which was used by Dr Robert Ballard during his exploration in 1986 of the wreck of the *RMS Titanic*, which lies on the sea floor at a depth of ~3,800 m from the surface. In addition, in 2013, WHOI became the home of the HOV *Deepsea Challenger,* in which Director and Explorer, James Cameron made his solo dive to the Challenger Deep in the Mariana Trench, which at ~11,000 m is the deepest place on Earth.

The National Marine Fisheries Service (NMFS)

The first scientific community in Woods Hole was the United States Commission of Fish and Fisheries, which was established in 1871 for studying the marine flora and fauna living in the pristine waters of Cape Cod. Today, this institution is called the National Marine Fisheries Service (NMFS). It is a division of the National Oceanic and Atmospheric Administration (NOAA), and the scientists there conduct research on the conservation of marine species such as whales, corals and sea turtles, and they also investigate the status of commercial fish stocks, and whether fisheries are productive and sustainable.

The U.S. Geological Survey, Sea Education Association and Woods Hole Research Center

The USGS came to Woods Hole in the 1960s when its branch of Atlantic Marine Geology opened for investigations into the geology and geophysics of the Atlantic, Caribbean and the Gulf of Mexico. Since then the Sea Education Association (SEA) and the Woods Hole Research Center (WHRC), smaller, independent Woods Hole scientific institutions were established in 1975 and 1985, respectively. The SEA is dedicated to educating people about the importance of the ocean in our lives, whereas the WHRC tackles world-wide environmental issues.



Map of Woods Hole village showing the buildings of the Marine Biological Laboratory, Woods Hole Oceanographic Institution and the National Marine Fisheries Service.

How the JUSTL Programme Began

Prof. Andrew L. Miller described to me how the Joint Universities Summer Teaching Laboratory (JUSTL) programme came about. He told me that before he came to work at HKUST he spent 7 years as a year-round scientist at the Marine Biological Laboratory (MBL) and every summer he used to look forward to the summer scientists coming and the summer courses starting because it was a great opportunity for him to attend the lectures and learn about the latest findings of these world-class researchers in the areas of embryology, physiology and neurobiology.

When Prof. Miller came to Hong Kong, he continued to go back to the MBL each summer, and he thought that it would be a great idea if some of his own students could take the summer courses. One of Prof. Miller's PhD students, Omi Ma applied for the *Embryology* course in 2004, and he was lucky enough to be selected as one of the 24 students that year. Omi very enthusiastically threw himself into the course and he did so well that at the end, the Director of Education at the MBL, Dr Lenny Dawidowicz asked Prof. Miller if there were any other students like him in Hong Kong as they should be encouraged to apply for one of the courses. This was the fantastic impression that Omi made.

Prof. Miller considered Dr Dawidiwicz's suggestion, discussed them with his collaborator and friend, Prof. Robert Baker from New York University Medical School who has been an MBL summer visitor since 1972, and together they decided to try to set up their own course as a means to provide a unique educational and research experience for post-graduate life sciences students in Hong Kong. The students would not be able to attend the practical sessions of the MBL Summer courses, but at least they could go to the morning lectures, which were (and are) open to everyone. In addition, to give the JUSTL students some laboratory experience, the idea was that the Director would rent laboratory space so that the students could work on their own project in the afternoons and evenings. Also, in many cases students would have the opportunity to work in the laboratory of one of the year-round scientists or one of the visiting summer scientists who were willing to mentor a JUSTL student. In most cases, when researchers were contacted and asked if they wanted a hard-working dedicated student helper for the summer months for free (because the programme would pay for the flights, accommodation and food), most found it a very attractive offer and of course said yes.

So the idea that evolved was that six of the brightest, most promising life science post-graduate students from Hong Kong would be selected to go to the MBL for two months each summer. The only challenge was to raise funds to support this programme. However, in 2006, the Hong Kong Croucher Foundation most generously provided financial support to Prof. Miller. Funds were initially provided by the Foundation for a period of three years. However, after being awarded funds from the Croucher Foundation, funds were also sought from the Government of the Hong Kong Special Administrative Region (HK SAR) via their "Matching Funds Scheme". This application was also successful, which meant that Prof. Miller could run the JUSTL programme for six years rather than the three years he originally proposed. The JUSTL programme proved to be a major success among the Hong Kong post-graduate students, and so once these initial funds were spent in 2012, the Croucher Foundation very kindly provided funding for a further year, and Prof. Miller was successful in obtaining additional matching funds for one year from the Government of the HKSAR. After these funds were finished, the Croucher Foundation again very kindly provided some extra funds, which allowed Prof. Miller to take three students for the final year as well as to wrap up the programme at the MBL.

Prof. Miller took the first group of six participants to the MBL in 2007, and by the end of the JUSTL programme in 2015, a total of 49 post-graduate students and young researchers had experienced what the programme had to offer in terms of their career and personal development.

During the first year of the JUSTL programme, Prof. Miller asked the Croucher Foundation if they wanted him to take one student from each of the Hong Kong universities to ensure that they had an equal distribution across the higher education institutions in Hong Kong. However, the Croucher

Foundation replied that he should take the six best students who applied. This followed Noel Croucher's basic philosophy about building science and giving the best students the opportunity to expand their careers.

Most of the students came from The University of Hong Kong, The Chinese University of Science and Technology and The Hong Kong University of Science and Technology, because at the time that the programme began, these were the main powerhouses of research in Hong Kong. However, over the 9 years that the programme ran, students from City University of Hong Kong, The Hong Kong Polytechnic University and Hong Kong Baptist University also participated in the programme.

Although it was initially quite difficult to persuade the MBL to allow the programme to run due to concerns about the nature of the programme and availability of laboratory space, Prof. Miller recalls that the right people were there, and he and especially Prof. Baker had the ear of the important people at the MBL, who were persuaded to let them try the programme out. In addition, one problem with Woods Hole during the summer is that in addition to attracting researchers from all over the world, it is also a very popular New England holiday resort. The islands of Martha's Vineyard and Nantucket are nearby, and so housing is hard to come by and very expensive in the summer. So a key to the success of the programme was that the MBL were willing to provide housing for the JUSTL students. The accommodation wasn't very luxurious but it was what Prof. Miller called "all part of the MBL programme experience."

The JUSTL programme ultimately ran between 1997-2015, and in that time most of the JUSTL participants were mentored by researchers at the MBL. Some of these were year-round scientists who were based at the MBL year round, but the majority were visitors from other universities and institutions who rented a laboratory at the MBL for two or three months during the summer. Several of the JUSTL participants were not affiliated with laboratories at the MBL but instead worked on projects with scientists based at the WHOI or at the NMFS.

In addition to their laboratory-based projects, most of the JUSTL participants regularly attended lectures and workshops at the MBL. Most went to the daily morning lectures of the *Neurobiology*, *Embryology* or *Physiology* courses, but others found the lectures of some of the other courses, such as the *Microbial Diversity* course and the *Neural Systems and Behavior* course, to be more relevant to their field of research interest. As well as the daily summer course lectures, the JUSTL participants also regularly attended the Friday Evening Lectures. These lectures are a long-standing tradition at the MBL having been started in 1890 and run each summer since, with the speakers being selected for being superstars in their particular field. Since 1970, for example, 30 Nobel Prize winners have given a lecture in this series. In addition, during the course of the JUSTL programme Prof. Eric Betzig (2014 Nobel Prize for Chemistry), Prof. John B Gurdon (2012 Nobel Prize for Physiology or Medicine) and Prof. Osamu Shimomura (2008 Nobel Prize for Chemistry) all gave lectures in the Friday Evening Lecture series, which were attended by the JUSTL participants.


Prof. Andrew L. MILLER
Director of the JUSTL Program

Remarks from the JUSTL Co-Directors

I asked the JUSTL Co-Directors, Prof. Robert Baker (Professor Emeritus, Department of Neuroscience and Physiology, New York University Medical School, New York, USA), and Prof. Karen Crawford (Professor of Biology, St Mary's College of Maryland) to describe their role in organising the programme in the US, and interacting with the Hong Kong students.

Prof. Robert Baker

"First and foremost, based on my lengthy scientific and funding history at MBL I acted as the interface/liaison with the Director and his Administration to secure both the research laboratory and necessary student housing during the most intense summer research and teaching season. This in turn created an important community research environment for the students along with allowing each student access to the multidisciplinary course lectures presented by the most outstanding scientists in each expertise.

Second, given my longtime acquaintances with many resident MBL scientists along with those establishing summer laboratories, I was able act as the intermediary for arranging appropriate student mentorships. This was essential because of the diversity of student interests that extended from botany through biology.


Prof. Robert Baker
JUSTL Program Co-Director

In turn, my awareness and contact with the expertise available at MBL helped in the student selection process.

Third, I interacted on a daily basis with all the students, under my direction or elsewhere, to ensure that their needs/adjustments where being satisfied.

Finally, for the vast majority of students, the MBL experience was their first venture from Hong Kong and contact with Western Culture, so we assisted in making sure that their social experience complemented their scientific.

In addition, I would add that the whole involvement from student interview through selection and mentorship led to long term connections in which I could facilitate individual careers and maintain communication.

Overall, I believe that the JUSTL programme was particularly worthwhile for the universities in Hong Kong to establish a collaborative arrangement with the international scientific community."

Prof. Karen Crawford

"My participation in the JUSTL programme grew from scientific collaborations and connections from my work as a summer scientist at the MBL. With the invitation to serve as a co-director, it was my great honor and privilege to work with Drs. Miller and Baker over the years to mentor and coordinate the day to day scientific activities of the many JUSTL participants. In addition to serving as a research mentor to many, developing relationships that often persisted long after our eight-week programme, my presence in the JUSTL laboratory allowed me to keep my thumb on the pulse of the JUSTL participants. In this role, my job was to help each participant to navigate the challenges of arriving in a new country, settle in quickly, secure resources and equipment for their studies, and weather any unforeseen challenges they might experience. While the MBL had already become an important place in my scientific career, seeing it anew through the eyes of so many wonderful young scientists, experiencing their discoveries and sharing in their adventures, deepened my appreciation for the unique synergy, community and opportunity the MBL provides. It was rewarding to watch our participants grow through their eight weeks at the MBL to become as comfortable, confident and savvy, as any other graduate student or postdoctoral fellow at the MBL. Sharing their process and growth through daily research challenges, mid-programme progress reports and presentations, and synthesis of their projects into a formal final report and public presentation at our end of programme research symposium, exemplified the fundamental nature and power of collaboration in science. Throughout this process, it was evident that each JUSTL participant grew tremendously within our programme, developing both resilience and confidence, departing from the MBL with a new network of collaborators and mentors to support and influence their developing careers.

While our primary focus was always upon science and discovery, participants were encouraged to explore the many local destinations and environments around Woods Hole and New England. Whale watching trips out of Provincetown, MA at the tip of Cape Cod, ferry rides to nearby Martha's Vineyard, and weekend bus adventures to Boston and New York City, all expanded their experiences and broadened their perceptions of life and opportunities within the United States of America. Moreover, taking advantage of being stateside, many of these trips included interviews for future graduate school and postdoctoral opportunities. It was a tremendous pleasure and privilege to hear about and share in their adventures.

Prof. Karen CRAWFORD
JUSTL Program Co-Director

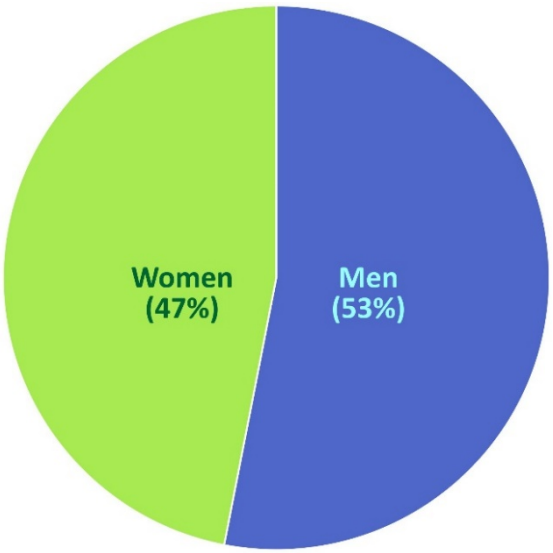
At least once each summer, we would gather at my cottage for a meal. It was my pleasure to provide an opportunity to cook for this extraordinary group. Over great pots of rice, vegetables and meats, my heart warmed when the students, grateful for a break from dining hall food, would say, "*it tastes like home".*

When I consider one of my fundamental roles in the JUSTL programme, a particular occasion comes to mind. Late one evening, just at sunset, I had a call to come back to campus. A JUSTL participant had

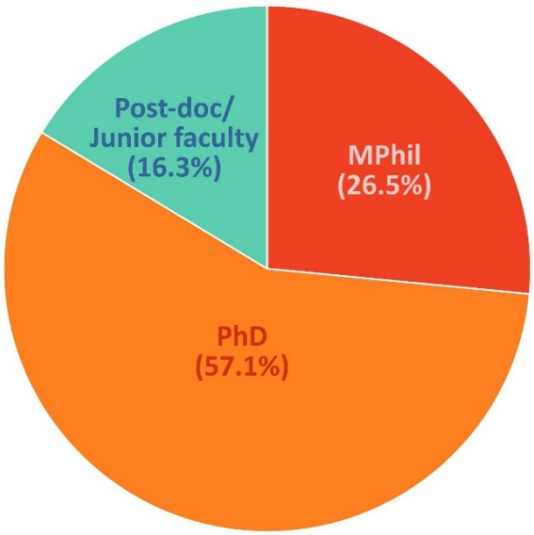
caught a large Bluefish off the dock on a three-prong fishhook. Once landed, the angry fish managed to jump onto the foot of his captor, impaling one of the remaining prongs deep into the top of his foot. By the time I arrived, while the fish was nowhere to be seen, the hook was still deeply in place in the fisherman's foot centered in a large and growing angry red welt. Piling into my car, I drove 4 JUSTL participants, the patient and his support team, to the Emergency Room at Falmouth Hospital. Upon registering, the woman behind the desk asked the patient, *"who is your guardian?"* Perhaps anxious in a new setting, it was clear he didn't quite understand her question. She followed this with, *"who takes care of you?"* To that question, the fellow with the hook in his foot, raised his finger and pointed at me. Insurance information was transferred, the hook was removed, and we were off to pick up antibiotics at the all-night pharmacy. The next day I was grateful to see that the large red welt had resolved and there was no evidence of a developing infection. Both scientifically and personally, being so far from home, I believe each JUSTL participant felt that they had someone at the MBL who would take care of them. I am humbled and grateful to have played a small role in their scientific path, paths that for our participants can only be described as outstanding."

The JUSTL Programme in Numbers

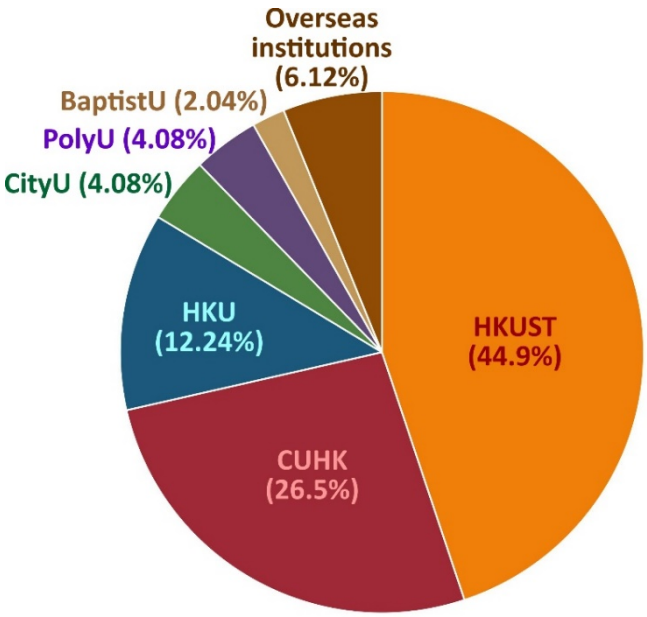
Between 2007 and 2015, a total of 49 Hong Kong graduate (MPhil and PhD) students and Post-Doctoral researchers or junior faculty participated in the JUSTL programme. The following three pie graphs show the distribution of male *versus* female attendees as well as the stage of career and the Universities where they were studying (or employed) at when they participated in the JUSTL programme.



The percentage of men and women who attended the JUSTL programme.

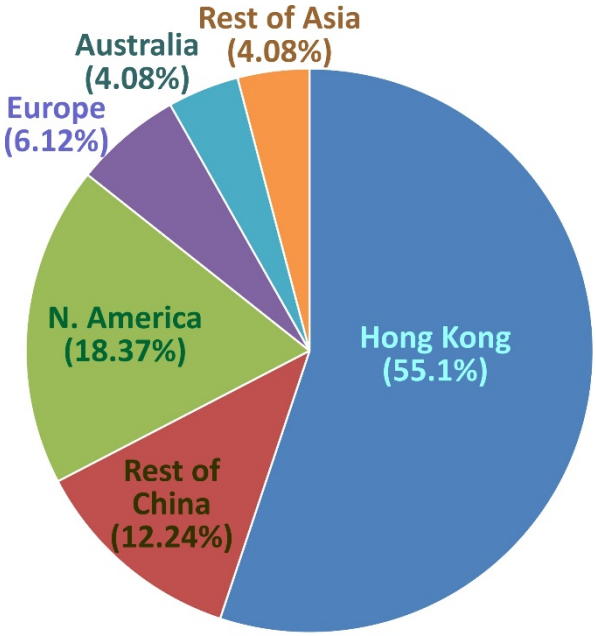


The distribution of MPhil students, PhD students and Post-doctoral researchers/junior faculty who attended the JUSTL programme.

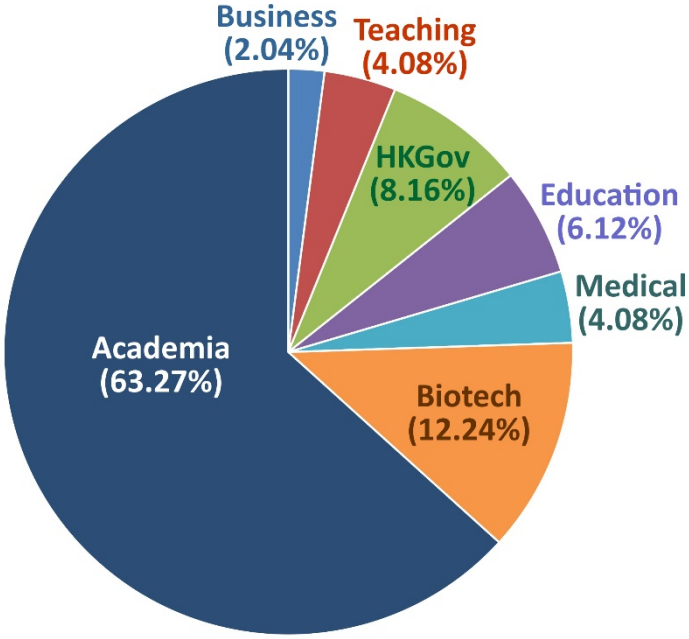


The percentage of students attending the JUSTL programme from the various universities in Hong Kong and overseas.

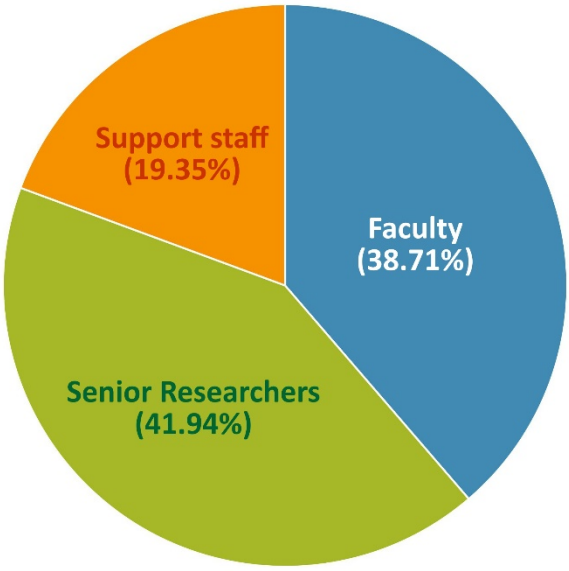
These next three pie graphs illustrate where the JUSTL participants are living and working today.



The percentage of JUSTL alumni who are currently working in Hong Kong, the rest of China or other parts of the World.

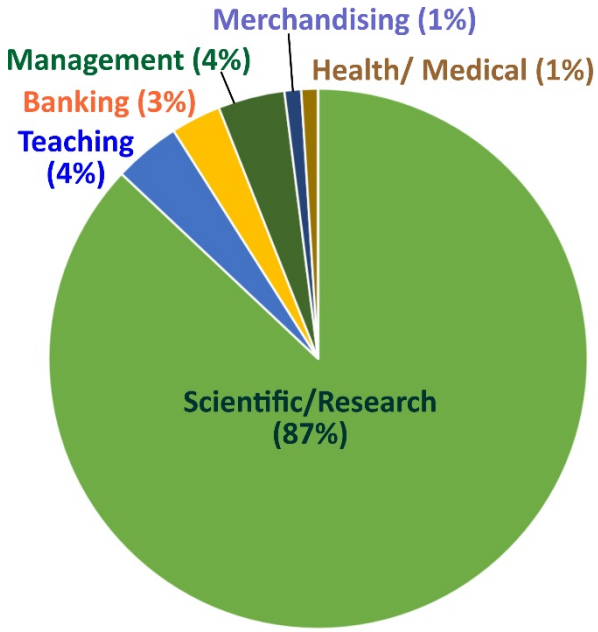


The distribution of professions among the JUSTL alumni. One of the teachers also participates in TV talk shows for RTHK.



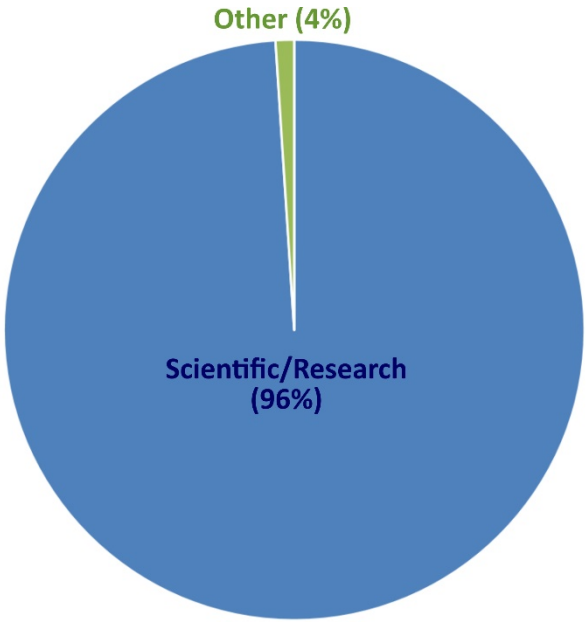
With regards to the alumni working in academia, this chart shows the distribution of positions held.

The final two pie graphs provide a comparison of the percentage of JUSTL participants who have stayed on in the sciences when compared with the percentage of life science students who graduated with a PhD or MPhil from a Hong Kong university. As the data available for these university students only started in 2011, and as the JUSTL programme only ran to 2015, the comparison has been made between 2011-2015.



Percentage of life science students who stayed in a science profession or who moved to a different profession after graduation. Data were distilled from one HK university and show the percentage of PhD and MPhil students in the life sciences who graduated between 2011-2015.

Percentage of JUSTL participants who are in a science profession. For direct comparison, data were acquired for those participants who attended the JUSTL programme between 2011-2015.



The JUSTL Participants Today

The following table shows the current position and affiliation of the JUSTL programme alumni.

Name	Current Position	Current Affiliation
2007		
Cora Sau-Wan LAI	Assistant Professor	School of Biomedical Sciences, The University of Hong Kong, Hong Kong, China
*Alice LIE	Post-Doctoral Guest Researcher	Prof. Dave Caron's laboratory, University of Southern California, Los Angeles, CA, USA
Katherine Yueping QIAN	Senior Clinical Manager	Intuitive Surgical-Fuson Medical Technologies, Shanghai, China
Summer Min SHEN	Asia Pacific Sustainability Leader	The Dow Chemical Company Shanghai, China
Tori Nan XIAO	Assistant Professor	Arthur A Dugoni School of Dentistry, University of the Pacific, San Francisco, CA
Junyu XU	Associate Professor	Center of Neuroscience, Zhejiang University, Hangzhou, China
2008		
Chris Yuk Kam CHEUNG	Research Associate	Department of Applied Biology and Chemical Technology, The Hong Kong Polytechnic University, Hong Kong, China
Danny Ka Chun FUNG	Assistant Scientist	Prof. Jade Wang's laboratory, Department of Bacteriology, University of Wisconsin-Madison, Madison, WI, USA
Stephanie Wai Kwan LAM	Immigration Officer	Hong Kong Government Immigration Department, Hong Kong, China
Raymond Kwan Keung LEUNG	Senior Resident training in Psychiatry	Tai Po Hospital, Hong Kong, China
Jack Wai Ho TANG	Principal Investigator	Institute of Pediatrics, Guangzhou Women and Children's Medical Centre, Guangzhou Medical University, Guangzhou, China
Ling Ming TSANG	Assistant Professor	Simon FS Li Marine Science Laboratory, The Chinese University of Hong Kong, Hong Kong, China

2009		
Vincent Chun Wai KWAN	Research Scientist	Dr Yu-Chiun Wang's laboratory, RIKEN Center for Biosystems Dynamics Research, Kobe, Japan
Connie Pui Ling LAU	Marine Parks Officer (Education)	Agriculture, Fisheries and Conservation Department, Hong Kong, China
Johnson Kai Yu NG	Senior Technical Officer	School of Biomedical Sciences, The University of Hong Kong, Hong Kong, China
Graham Ka Hon SHEA	Clinical Assistant Professor	Department of Orthopaedics & Traumatology, LKS Faculty of Medicine, The University of Hong Kong, Hong Kong, China
*Sharon Tsz Huen WU	Secondary school teacher	Unknown
Michael Yat Fai YUEN	Scientific Officer	University Research Facility in Life Sciences, The Hong Kong Polytechnic University, Hong Kong, China
2010		
*Steve Hiu Chi CHONG	Manager	New B Innovation Ltd., Hong Kong (Biotech company), Hong Kong, China
Hongmei JING	Principal Investigator	Institute of Deep-sea Science and Engineering, Chinese Academy of Sciences, Sanya, China
Karen Wing Man LEE	Business owner	Cannes, France
*Helen Hok Lun MA	Secondary school teacher and RTHK talk show participant	Unknown
Kit Man TSANG	Staff Scientist	Dr Beth Kozel's laboratory, National Heart, Lung and Blood Institute, National Institutes of Health, Bethesda, MD, USA
Tim Yue Him WONG	Assistant Professor	Institute for Advanced Study (IAS), Shenzhen University, Shenzhen, China
2011		
*Stella Sze Wai CHAN	Research Scientist	Hai Kang Life Corporation Ltd (Hong Kong) (Biotech company), Hong Kong, China
Jacky Chun Kit KWOK	Marine Conservation Officer	Agriculture, Fisheries and Conservation Department, Hong Kong, China
Penny Pui Ying LAM	Post-doc	Department of Pharmacology and Toxicology, University of Utah, Salt Lake City, UT, USA
Stanley Chun Kwan LAU	Associate Professor	Division of Environment and Sustainability & Division of Life Science, The Hong Kong University of Science and Technology, Hong Kong, China

Clare Hau In LUN	Visiting Scholar	Division of Environment and Sustainability & Division of Life Science, The Hong Kong University of Science and Technology, Hong Kong, China
Kosmo Ting Hing YAN	Biotechnology Manager	Geb Impact Technology Co. Ltd., Hong Kong, China
2012		
Sarah E WEBB	Visiting Scholar	Division of Life Science, The Hong Kong University of Science and Technology, Hong Kong, China
Jacque Pak Kan IP	Research Scientist	Massachusetts Institute of Technology, Boston, MA, USA
Jeffrey J KELU	Post-doc	Randall Centre of Cell and Molecular Biophysics, King's College, London, UK
Chi Wai LEE	Assistant Professor	School of Biomedical Sciences, The University of Hong Kong, Hong Kong, China
Ian Wing Yin MO	Lecturer	School of Science & Technology, The Open University of Hong Kong, Hong Kong, China
Mana Man Na YUNG	Research Assistant Professor	School of Science & Technology, The Open University of Hong Kong, Hong Kong, China
2013		
Jacky Tin Shing HUNG	Technical Officer of Faculty Core Facility	Faculty of Medicine, The University of Hong Kong, Hong Kong, China
Edward Tak Chuen LAU	Endangered Species Protection Officer	Agriculture, Fisheries and Conservation Department, Hong Kong, China
Maggie Wai Ming LI	Research Associate	Department of Biochemistry and Molecular Biology, University of Northern British Columbia, Prince George, BC, Canada
Franki Kai Hei TSE	Assistant Professor	Department of Health, Technology and Informatics, The Hong Kong Polytechnic University, Hong Kong, China
2014		
Tjasa Boh WHITEMAN	Applying for PhD positions	Canberra, Australia
Harvey Yin Seng CHAN	PhD student	School of Biological Sciences, Nanyang Technical University, Singapore
Idy Hiu Ting HO	Lee Hysan Postdoctoral Fellow	Nuffield Department of Clinical Neurosciences, University of Oxford, Oxford, UK
Jason Wing-yiu KAN	Pharmacokinetics Specialist	Clinical Trials Centre, The University of Hong Kong, Hong Kong, China

Ho Chi LEUNG	Technical Officer	Faculty Core Facility, Faculty of Medicine, The University of Hong Kong, Hong Kong, China
Raymond Ka Ho YIP	Post-doctoral Fellow	Walter and Eliza Hall Institute of Medical Research, Melbourne, Australia
2015		
Helen Baixia HAO	Research Associate	Aegle Research LLC, Allendale, NJ, USA
Ho Chi LEUNG	Technical Officer	Faculty Core Facility, Faculty of Medicine, The University of Hong Kong, Hong Kong, China
Lingyu (Joe) ZHOU	Quality Improvement Data Analyst	Department of Cardiology, Boston Children's Hospital, Boston, MA, USA

**Information was obtained from the internet or via a third party, and confirmation could not be obtained from the participant.*

Lillie Building at the MBL

Reports about the JUSTL Participants

Ms Tjasa BOH WHITEMAN

Ms Tjasa Boh Whiteman is currently applying for PhD positions at the University of New South Wales at the Australian Defence Force Academy in Canberra, Australia. She is applying to engineering laboratories for projects to design robots for use in space. She was an MPhil student in the engineering laboratory of Prof. John Billingsley at the University of Southern Queensland but was actually working with a collaborator, Dr Robin Bradbeer (formerly of the Centre for Robotics and Automation at City University of Hong Kong), when she attended the JUSTL programme in 2014.

JUSTL Programme

Ms Boh Whiteman was one of the few participants to work at the Woods Hole Oceanographic Institution (WHOI) rather than at the MBL, and she was the only engineering student who attended the JUSTL programme. At WHOI, Ms Boh Whiteman's mentor was Dr Michael Jakuba, Senior Engineer in the Department of Ocean Physics and Engineering, and during her two months in Woods Hole, Ms Boh Whiteman was involved in the ROV nUI (remotely operated vehicle nereid under ice) project. At the time, the nUI was a new ROV that was being developed to work exclusively on the deep-sea floor under ice, using a data-only fiber optic tether about three times the width of a human hair to provide the back link to the support ship. The main structure of the vehicle was already complete when Ms Boh Whiteman arrived in Woods Hole and so her job was to help install and test the navigation, instrument telemetry and other systems. She was also involved in testing the deployment mechanisms and calculations of tether behaviour, which led to successful deployment.

She also introduced the project team she was working with, to the aviation style of instrument panels and the human factors behind them. This involved showing the team the instrumentation panels on various aircraft, from planes at the local airport to large modern jets, to highlight the differences between digital and analogue control panels and why they have been designed the way they have.

One event that Ms Boh Whiteman remembers well is when she was invited to give a presentation describing her MPhil work on underwater traction. She recalls that there was a room full of professionals who came to hear her speak, and she said that this is when she realised that, "… this is where I belong, this is what I should be doing. It was scary but it felt right."

Ms Boh Whiteman also recalls Deepsea Challenger being at WHOI when she was there. This is the deep-diving submersible, which was designed to reach the floor of Challenger Deep, which is located in Mariana Trench in the Western Pacific Ocean. The Canadian film director, James Cameron, piloted the vessel and reached this deepest point on Earth in March 2012. Ms Boh Whiteman remembers that they would "quite shamelessly" take batteries and other spare parts out of Challenger for use on the nUI.

"The ability to work alongside the world's top experts in the Deep Sea Robotics programme was an exceptional opportunity, which I am very grateful for."

Ms Boh Whiteman describes her time in Woods Hole as being "absolutely phenomenal." She still keeps in contact with Dr Jakuba as well as other members of the ROV team. She said that the various people she met there were all very experienced and experts in their field. However, one person who Ms Boh Whiteman particularly remembers is Ms Loral O'Hara. She was an engineer who worked at WHOI on the deep-ocean research submersible, *Alvin*, and the ROV, *Jason*. However, in 2017 Ms O'Hara got selected to join the astronaut training programme at NASA.

To sum up her time in Woods Hole on the JUSTL programme, Ms Boh Whiteman said, “The ability to work alongside the world’s top experts in the Deep Sea Robotics programme was an exceptional opportunity, which I am very grateful for. In the field of marine robotics, especially for deep sea operations, there are only a handful of institutes in the world that have the capability and expertise to run current operations and ongoing research simultaneously. There are even fewer institutes that willingly accept students and incorporate them into existing teams, making them vital parts of the project. WHOI does all of these things, and the JUSTL programme provided me with the opportunity to experience this first-hand.”

Mr Harvey Yin Seng CHAN

Mr Harvey Yin Seng Chan is a PhD student in Nanyang Technological University (NTU) in Singapore working in the laboratory of structural biologist, Dr Sara Sandin. He obtained his MPhil degree in early 2015 from the Division of Life Science, The Hong Kong University of Science and Technology, under the supervision of Prof. Andrew L. Miller, where he conducted morphometric analysis of, and characterised the calcium signals generated by, human embryonic stem cell-derived cardiomyocyte progenitor cells.

Current Work

Mr Chan is just about to enter the final year of his PhD studies in Dr Sandin’s laboratory at NTU. He is investigating the spatial packaging of nucleosomes into heterochromatin as a first step in understanding the organization of chromatin in eukaryotic cells. His project involves using correlative light-electron microscopy (CLEM) to visualise the structure of heterochromatin *in vivo* in a human adult somatic cell line. With an FEI CorrSight microscope platform, the cells are first imaged via spinning disk confocal or wide-field fluorescence microscopy. They are then ultra-microsectioned for imaging under the electron beam. The images acquired via the two different imaging modalities (i.e., fluorescence plus electron microscopy) are then correlated manually. In the somatic cell line that Mr Chan uses, for example, proteins that are known to play a role in maintaining the structure of heterochromatin are tagged with both enhanced green fluorescent protein (eGFP) and ascorbate peroxidase 2 (APEX2) for visualization with fluorescence and electron microscopy (EM), respectively. The fluorescence images allow Mr Chan to identify and localize specific regions of interest in the cells, whereas the EM-derived images provide higher resolution information about the heterochromatin, for further subsequent analysis.

JUSTL Programme

Mr Chan was a participant in the 2014 JUSTL programme. He was jointly mentored by the JUSTL Director, Prof. Andrew L. Miller (Division of Life Science, The Hong Kong University of Science and Technology), Mr Alan Shipley (Applicable Electronics, New Haven, CT, USA), Dr Alessandro Rubinacci (San Raffaele Hospital, Milan, Italy) and Prof. Paola Divieti-Pajevic (Massachusetts General Hospital, Boston, MA, USA). Mr Chan was involved in setting up and running the instrumentation used for conducting the Scanning Vibrating Electrode Technique (SVET). This equipment was designed by Mr Shipley and is used for measuring voltage potential differences in the extracellular environment around cells and tissues in a non-invasive manner. In addition to setting up the equipment, Mr Chan was shown by Dr Rubinacci and Prof. Divieti-Pajevic how to dissect the metacarpal bone from mouse posterior limbs prior to measuring calcium ion fluxes via the Scanning Ion-selective Electrode Technique (SIET).

Mr Chan described his experience in the JUSTL programme as being unique. The MBL had just recently merged with the University of Chicago, and Mr Chan recalls a large number of scientists at the MBL both from within the US and from around the world, so "it was a fantastic opportunity to network both with students and with faculty." He enjoyed talking about science in a relaxed environment, and being introduced to the projects that other people are interested in and the different techniques that are being used. He was especially interested in finding out about equipment that was newly launched as this is where companies show-case their new lines. He told me that from this point of view, there is nowhere quite like the MBL.

"It was a fantastic opportunity to network both with students and faculty."

Mr Chan still keeps in contact with the other JUSTL participants from 2014, as well as various other people who he met while at the MBL. These include bioinformatics experts, Özcan Esen (from Prof. A. Murat Eren's laboratory, University of Chicago), and Doğancan Özturan (from Prof. Nathan Lack's laboratory, Koç University School of Medicine, Istanbul, Turkey and Vancouver Prostate Centre, Vancouver, Canada). This is also where he met Dr Jennifer Morgan (Director of the Eugene Bell Center, MBL) who runs the *Frontiers in Stem Cells and Regeneration Advanced Training* course at the MBL. Indeed, it was chatting with Dr Morgan that inspired Mr Chan to apply for this course and he was fortunate to be accepted on the course that ran during autumn 2015.

In addition to his research project, Mr Chan also attended various lectures, seminars and workshops. One series of workshops that Mr Chan found to be very useful and interesting was called "Shaping and Understanding Career Choices in Education, Science and Self (SUCCESS)." In these, he said that participants learned how to 'survive' in the academic environment, including how to set up a laboratory and how to prepare grants. They also provided networking advice and job searching skills specific for academia and industry.

Mr Chan was also given the opportunity to go on a plankton collection field trip with students participating full-time on the *Embryology* course. Together, they went out to sea in the MBL's specimen collecting vessel, Gemma, and collected the larvae of various different organisms such as crab, lobster and squid. They also brought up a number of species from the sea bed including sea stars and whelks, which were taken back to the MBL for further investigation.

All in all, Mr Chan found his time at the MBL to be a unique experience and one that he'll never forget. He said that "the MBL has been around for over a hundred years and being able to do research over the summer in such a prestigious institution has been phenomenal."

Dr Danny Ka Chun FUNG

Dr Danny Ka Chun Fung is an Assistant Scientist in Dr Jade Wang's laboratory in the Department of Bacteriology at the University of Wisconsin-Madison (US). Dr Fung was awarded his PhD in 2010 in Prof. Raphael Chan's laboratory in the Department of Microbiology at The Chinese University of Hong Kong. His project focused on the phenomenon known as 'antibiotic tolerance' where antibiotic-susceptible bacteria become refractory to antibiotic treatment. Dr Fung told me that, "This is a long-standing but still poorly understood problem that causes relapse of bacterial infections despite modern antibiotic therapy." Dr Fung's research was involved in determining the physiological and

Gemma, the MBL specimen collecting vessel

genetic factors that cause antibiotic tolerance in *Escherichia coli,* which is a bacterium typically found in the lower intestine of warm-blooded animals. After completing his PhD, Dr Fung received post-doctoral training in Dr Aixin Yan's laboratory in the School of Biological Science at The University of Hong Kong, during which time, he investigated two-component signaling systems in bacteria, and how they regulate the transport of small molecules such as metals and antibiotics.

Current Work

Dr Fung began working in the University of Wisconsin-Madison in 2015. He investigates stress-induced second messengers, called alarmones, in bacteria. Alarmones are found throughout the bacterial kingdom and are frequently essential to stress tolerance and pathogenesis. Dr Fung is studying the role of (p)ppGpp, a highly conserved alarmone, on antibiotic tolerance and persistence in bacteria, and has demonstrated that it is responsible for multiple pathways that cause bacteria to become highly refractory to antibiotic treatment. In addition, as (p)ppGpp signaling only exists in bacteria and in plant chloroplasts, but not in animals, it is considered to be an excellent target for the development of the next generation of antibiotics.

JUSTL Programme

Dr Fung was a participant in the 2008 JUSTL programme. His mentor was Dr Fred Chang (now at University of California San Francisco), and his research project involved using confocal microscopy to visualize the actin and tubulin components of the cytoskeleton in quiescent yeast cells. Dr Fung recalls that, "It was a formidable challenge for both of us. I work on bacterial quiescence in Hong Kong but know very little about yeast physiology. On the other hand, Fred is an expert on the yeast cell cycle but not so much on non-dividing or quiescent cells. Fortunately, this interesting combination worked much better than either of us expected."

Before applying for the JUSTL programme, Dr Fung was concerned that the MBL might not be the right place for a microbiologist to work. He was interested in bacterial physiology whereas the MBL was (and is) most well-known for the research conducted on marine organisms. He was happy to find that he was worrying needlessly as he found that, "the MBL is such as unique place, as any biologist, regardless of his or her research area, can gain invaluable research experience that few other places can offer."

"The MBL is such as unique place, as any biologist, regardless of his or her research area, can gain invaluable research experience that few other places can offer."

In addition to his research project, Dr Fung attended the *Microbial Diversity* course lectures. In his end-of-programme report, he said that, "For anyone with research interest in microbiology, this is *the* course to attend. Most of the lectures were given by world experts in their specific area, and many are the best microbiologists of our time. I've learned a lot from these lectures, not only on the knowledge in very specific areas of microbiology but most importantly they enabled me to develop a deep sense of appreciation to the beauty and complexity of the microbial world from a much broader perspective, which I think is a basic requirement of any up-and-coming microbiologist." Indeed, it was following the *Microbial Diversity* course that Dr Fung became especially interested in bacteriology, and this is the field he is working in today.

When I asked Dr Fung if participating in the JUSTL programme helped to shape his career, he told me that during his time at the MBL, he was debating whether he should continue doing research after his PhD. "The programme made me realize my interest in research, which in the end inspired me to go for an academic research career."

Dr Helen Baixia HAO

Dr Helen Baixia Hao is currently a Research Associate at Aegle Research LLC, Allendale, New Jersey, USA. Dr Hao completed her PhD in 2013 in the laboratory of Dr Jianbo Yue (formerly of The University of Hong Kong), conducting research on the regulation and function of store-operated calcium entry during the neural differentiation of mouse embryonic stem cells. She then conducted post-doctoral research, first at The Hong Kong University of Science and Technology in the Division of Life Science in the laboratory of Prof. Andrew L. Miller, and then at the W.M. Keck Center for Collaborative Neuroscience at Rutgers University (New Jersey, USA) with Profs Melitta Schachner and Wise Young.

Current Work

Dr Hao started working with Aegle Research LLC in April 2019 where she is currently involved in isolating and culturing immune cells from the blood of cancer patients. After the culture process, the activated immune cells are then transfused back into the patient. This is a new therapeutic treatment for patients where conventional chemo- and radio-therapeutic methods are no longer a viable option. This technique has shown promising results in clinical trials, especially in patients with late-stage lung cancer and pancreatic cancer.

JUSTL Programme

Dr Hao was one of the more senior JUSTL participants as she was a Post-Doctoral Fellow when she attended the JUSTL programme in 2015. At the MBL, Dr Hao worked with Dr Marko Horb (Senior Scientist and Director of the National *Xenopus* Facility at the MBL) where she helped to screen and identify transgenic *Xenopus laevis* and *Xenopus tropicalis* larvae that expressed aequorin in all the cells of the body or just in the neurons. The transgenic *Xenopus laevis* lines had previously been prepared by JUSTL participant, Dr Edward Lau, in 2013.

Dr Hao enjoyed her summer at the MBL. She told me that "the scientific environment in Woods Hole is very impressive" as she met people doing research from "all over the world who were working on different projects." Dr Hao remembers the seminars that she attended – during lunch-times and most evenings as well as the open talks during the day for the various MBL Summer courses. There were regular Friday evening lectures, which were held throughout the summer and these were also open to the general public. Dr Hao remembers one lecture in particular where Prof. Cheryl Hayashi (Curator, Professor and Director of Comparative Biology Research at the American Museum of Natural History, New York, USA), described her work on elucidating the genetic structure of spider silk. However, it was the Thursday evening neuroscience lectures that really inspired Dr Hao. Indeed, it was learning about cutting-edge research being applied in neuroscience research that motivated her to apply for the Post-Doctoral Fellowship position at Rutgers University. To this end, Dr Hao firmly believes that attending the JUSTL programme helped to shape her career. Summing up her impressions about spending the summer at the MBL, Dr Hao said that "it was an inspiring and wonderful experience both for my scientific research and personal development."

"It was an inspiring and wonderful experience both for my scientific research and personal development."

Accommodation and cafeteria facilities at the MBL

Dr Idy Hiu Ting HO

Dr Idy Hiu Ting Ho has a Lee Hysan Post-Doctoral Fellowship, which is a four-year post-doctoral training programme that allows her to spend two years working with Prof. Irene Tracey at the Nuffield Department of Clinical Neurosciences at the University of Oxford (UK), followed by two years at the The Chinese University of Hong Kong. Dr Ho obtained her PhD in 2017 in the laboratory of Prof. Matthew Tak Vai Chan in the Department of Anaesthesia and Intensive Care at The Chinese University of Hong Kong, where she was working on a project to determine possible ways to treat chronic pain by disrupting the interaction between pro-brain-derived neurotrophic factor (pro-BDNF) and sortilin, the former being a protein known to play a role in a number of neurological disorders. After completing her PhD, Dr Ho worked as a Research Associate in the same laboratory, and at this time she was involved in various projects to investigate the changes that occur in neurons and immune cells in the spinal cord during chronic pain.

Current Work

Dr Ho started her Post-Doctoral training towards the end of 2018. She is currently working with Prof. Tracey at the University of Oxford, where she has been learning how to conduct functional magnetic resonance imaging (fMRI) of the human brain as well as performing some clinical studies to investigate the pain mechanism in human patients. With regards to the latter, the team is using a capsaicin-induced pain human model to investigate the neuronal activity in the spinal cord. She is also helping to establish the University of Oxford as one of the partners of the IMI-Paincare project in the IMI-PAINCARE consortium. The main focus of the Oxford team is to promote the use of neuroimaging as a biomarker of pain by looking at the pharmaco-dynamic efficacy of currently-used analgesics.

JUSTL Programme

Dr Ho was a participant in the 2014 JUSTL programme. She was mentored by the JUSTL Co-director, Prof. Robert Baker (New York University Medical School), Prof. Scott T. Brady (University of Illinois at Chicago, IL, USA), and Prof. Alexander F Schier (Harvard University). For the first half of her time in the US, Dr Ho worked in Prof. Schier's laboratory in Harvard University and learned how to transplant primordial germ cells in zebrafish embryos. She then brought the technique back to the MBL and set up a transplantation rig in the JUSTL laboratory with the help of Prof. Baker so that she could practice the procedure by herself. Dr Ho also spent several weeks in Prof. Brady's laboratory where she learned how to dissect the giant axon from the squid and then conducted vesicle motility assays to investigate the effect of recombinant tau protein and huntingtin on axonal transport. Dr Ho said that, "Prof. Brady is an enthusiastic scientist, an excellent teacher, and a great mentor. He ensures that everyone in his lab understands every detail of the experiment by repeatedly explaining and giving short talks on the subject."

Dr Ho also attended the lectures of the Summer courses. She said, "Top scientists in their respective fields were invited as lecturers, and they shared basic and specialized techniques as well as their important findings with students. I was very impressed by the active interactions between the lecturers and the students. The lecturers encourage the students to interrupt and ask questions immediately and anytime that they have questions…and they are perfectly willing to re-explain their ideas until no one is confused with the course content."

Dr Ho also remembers one of the Friday evening lectures that she went to. "There was a full-house and all the audience including the elderly and small kids were asking questions about the lecture. It was fascinating to see that a scientist could explain their detailed work to kids aged 3-5. This lecture motivated me to participate in some of the STEM courses for junior/senior secondary students when I was back in Hong Kong. I expect that in my future career, I will not only focus on my research work,

but also participate in more public engagement activities to show the public how interesting and important science is."

Dr Ho believes that the JUSTL programme gave her the confidence to take part in her current Post-Doctoral training programme and to continue to have a career in research. She said, "It wasn't a piece of cake for me to let go of everything in Hong Kong (including my research work and my usual life) for two whole years in my late twenties and start from scratch [in the UK] to learn a completely new technique. However, luckily it has just been confirmed that The Chinese University of Hong Kong will establish an fMRI research center in 2020. So taking part in the JUSTL programme showed me that chances are everywhere and usually, but sometimes unexpectedly, these can lead on to other good things."

Mr Jacky Tin Shing HUNG

Mr Jacky Tin Shing Hung is a Technical Officer at The University of Hong Kong Li Ka Shing Faculty of Medicine Faculty Core Facility. He obtained his MPhil in 2016 from the Division of Life Science at The Hong Kong University of Science and Technology in the laboratory of Prof. Andrew L. Miller, where he investigated the contribution of the scales of zebrafish to the short-term regulation of plasma calcium homeostasis.

Current Work

The Faculty Core Facility is a central facility, under the directorship of Prof. George Tsao, which houses a number of instruments available to the research community at The University of Hong Kong. The main clients are biomedical researchers and clinical scientists who bring samples for testing from the Queen Mary Hospital. The facility houses microscopes, flow cytometry equipment and various molecular biology instruments. There is also a core zebrafish facility in the same location. Mr Hung works half time looking after the microscopes and half time managing the zebrafish core facility. Regarding the latter, he is responsible for maintaining the different lines of fish kept in the facility and setting up the breeding pairs to obtain fertilized eggs.

JUSTL Programme

Mr Hung attended the 2013 JUSTL programme and he worked on a couple of projects under the mentorship of Dr Alessandro Rubinacci (San Raffaele Hospital, Milan, Italy), Prof. Andrew L. Miller (The Hong Kong University of Science and Technology), Prof. Joseph Kunkel (University of New England, Biddeford, ME), Dr Paola Divieti-Pajevic (Massachusetts General Hospital, Boston, MA) and Mr Alan Shipley (Applicable Electronics LLC., New Haven, CT). In one project, Mr Hung used a scanning ion-selective electrode technique (SIET) to measure the calcium ion fluxes around zebrafish scales. The results he obtained in the JUSTL programme helped his MPhil research when he returned to Hong Kong, which have just been published in the journal, *Fisheries Science**. In the second project, Mr Hung worked with Dr Rubinacci on an ongoing project to study the mechanisms and endocrine regulation of bone mineralization. Again using the SIET, Mr Hung conducted experiments to determine the generation of calcium ion fluxes into and out of bone tissue. The results on the bone project that Mr Hung helped to acquire during his time on the JUSTL programme have now been published in the journal *Bone**.*

"I'd seen a lot of his online talks before, but this was the first time I'd the chance to attend one of his seminars in person and see him standing there with a bottle of green fluorescent protein in his hand." (About attending a lecture by Prof. Osamu Shimomura, Nobel Prize Winner for Chemistry in 2008)

Mr Jacky Tin Shing HUNG is a Technical Officer of the Faculty Core Facility in the Faculty of Medicine at The University of Hong Kong

Mr Hung is especially appreciative for the help provided by Mr Shipley on the installation and use of the SIET, as well as for all the advice from Prof. Robert Baker regarding his MPhil project.

There were a few weeks during the JUSTL programme when Mr Hung also worked with George Bell, a Research Assistant in the laboratory of Dr Alan M. Kuzirian (Marine Resources Center, MBL). Mr Bell worked mainly with cephalopods and was investigating the tentacle structure of the Bobtail squid. Mr Hung learned some histology, which he said was very useful for some of the experiments he conducted in his MPhil project.

Mr Hung told me that one event in particular stood out for him. This was when Prof. Osamu Shimomura, one of the Nobel Prize winners for Chemistry in 2008 for his work on GFP (green fluorescent protein) and long-time resident at the MBL, gave one of the prestigious Friday evening lectures. Mr Hung said: "I'd seen a lot of his online talks before, but this was the first time that I'd the chance to attend one of his seminars in person and see him standing there with a bottle of green fluorescent protein in his hand."

**Hung TS*, *Webb SE, Palumbo C, Lesniak AM, Shipley AM, Rubinacci A, Kunkel JG, Miller AL (2019). Assessing the ability of zebrafish scales to contribute to the short-term homeostatic regulation of [Ca^{2+}] in the extracellular fluid during calcemic challenges. Fisheries Science doi:10.1007/s12561-019-01353-9.*

***Dedic C, **Hung TS**, Shipley AM, Maeda A, Gardella T, Miller AL, Divieti Pajevic P, Kunkel JG, Rubinacci A (2018). Calcium fluxes at the bone/plasma interface: Acute effects of parathyroid hormone (PTH) and targeted deletion of PTH/PTH-related peptide (PTHrP) receptor in the osteocytes. Bone 116: 135-143.*

Dr Jacque Pak Kan IP

Dr Jacque Pak Kan Ip is currently a Research Scientist in the laboratory of Prof. Mriganka Sur at the Institute for Learning and Memory at Massachusetts Institute of Technology (MIT; MA, USA). However, he will take up the post of Assistant Professor and set up his own laboratory in the School of Biomedical Sciences at The Chinese University of Hong Kong in early 2020. Dr Ip was awarded his PhD in Biochemistry 2012 in the laboratory of Prof. Nancy Ip at The Hong Kong University of Science and Technology, during which time he investigated the molecular mechanisms involved in establishing the polarity of cortical neurons during their migration, and how these are involved in hypersensitive reactions and seizures. During his PhD studies, Dr Ip was awarded a Croucher Foundation Studentship, a George K Lee Scholarship, and a Sir Edward Youde Memorial fellowship. After completing his PhD, Dr Ip worked in Prof. Sur's laboratory at MIT as a Post-Doctoral Fellow during which time he was awarded an International Brain Research Organisation Rita Levi-Montalcini Research Fellowship and a Human Frontier Science Programme Fellowship.

Current work

During his time in Prof. Sur's laboratory, Dr Ip has been involved in a number of projects. One involves using two-photon imaging to study neuronal plasticity *in vivo* in the mouse primary visual cortex. He has also been investigating Rett syndrome, a rare genetic neurological and developmental disorder that affects mainly girls, disturbing many aspects of their mobility, including their ability to breathe, walk, eat and speak. Dr Ip uses human patient-derived cells to model the disease, looking specifically at early developmental events such as neurogenesis and neuronal migration. When Dr Ip returns to Hong Kong and sets up his own laboratory at The Chinese University of Hong Kong, he proposes to combine elements of the research he conducted during his time as a PhD student and a Post-Doc, and thus act as a bridge between molecular and system neuroscience. His aim is to continue to apply his knowledge gained about disease-related proteins and investigate neurological disorders through interdisciplinary approaches.

JUSTL Programme

Dr Ip attended the 2012 JUSTL programme and his main mentor was Prof. Rodolfo Llinas, an MBL summer scientist from the New York University School of Medicine (New York, USA). At that time, Prof. Llinas was using the giant axon of the squid (*Doryteuthis pealii*) to study the circuit properties of the cerebellum and thalamus. Dr Ip learned how to dissect this axon from the squid in order for the electrophysiological properties to be investigated using intracellular recordings and the voltage clamp technique. Dr Ip was also involved in injecting Tau protein into the synapse of the giant axon, as part of a project to investigate how the build-up of Tau might lead to the synaptic failure known to occur in Alzheimer's disease.

"Neuroscience encompasses a wide range of different topics including molecular biology, electrophysiology, behaviour, neural circuitry and cognition. It was all rather overwhelming but exciting, and I tried to take in as much information as I could."

Dr Ip also attended lectures of the *Neurobiology* and *Neural Systems & Behavior* summer courses. He found them to be very helpful for obtaining a more in depth knowledge about the various neuroscience topics. As Dr Ip told me, "Neuroscience encompasses a wide range of different topics including molecular biology, electrophysiology, behaviour, neural circuitry and cognition. It was all rather overwhelming but exciting, and I tried to take in as much information as I could." This was where Dr Ip was first introduced to the use of two-photon imaging for the *in vivo* visualization of neuronal dendrites and spines in the mouse brain as a way to investigate their function and the changes they undergo during cortical plasticity. Indeed, it was following the *Neural Systems* course lectures at the MBL that Dr Ip was inspired to undergo his Post-Doctoral work in a laboratory utilizing two-photon imaging. He remains very grateful to the JUSTL programme for providing him with the opportunity to understand the wide range of neuroscience topics available, as this really helped him make a decision about what to do for the next stage in his career.

Dr Hongmei JING

Dr Hongmei Jing is a Principal Investigator in the Institute of Deep-sea Science and Engineering (IDSSE), Chinese Academy of Sciences in Sanya, China. She got her PhD degree from the University of Hong Kong in 2006 under the supervision of Prof. Steven B. Pointing in the Department of Ecology and Biodiversity. She worked on a project to identify the phylogenetic diversity and cultivation of the thermophilic cyanobacteria *Synechococcus* spp., from geothermal springs in Asia. After completing her PhD, Dr Jing had post-doctoral training at the University of Quebec (Montreal, Canada) from 2006 to 2008, before returning to Hong Kong to work as a Research Associate in the laboratory of Prof. Hongbin Liu at The Hong Kong University of Science and Technology Division of Life Science.

Current Work

Dr Jing has worked at the IDSSE since 2013, and her research mainly focuses on the molecular ecology of deep-sea microbes, especially their composition and their potential ecological functions in the biogeochemical cycling of carbon and nitrogen.

JUSTL Programme

Dr Jing attended the 2010 JUSTL programme, and she worked on a project with Dr Daniel Ward in Dr Scott Lindell's laboratory in the Marine Resource Center at the MBL to visualize lipid droplets in the

green alga, *Chlorella* sp. and the diatom, *Phaeodactylum* after labelling them with lipid-specific fluorescent dyes.

In addition to this research project, Dr Jing attended the summer course lectures on *Microbial Diversity*, and she was excited to meet so many people who had similar interests to her. She said, "I still clearly remember Dr Julie Huber's seminar about her exploration of the sub-seafloor microbes, and the video she took during her cruise, which showed her collecting samples from the hydrothermal environment, and I was very impressed by the prosperous ecosystems around the hydrothermal vent. At the time, Dr Huber's talk inspired me to do my own research to explore the beauty and mystery of deep-sea ecosystems. Almost ten years later (late 2018/early 2019), I joined a three-month cruise and used China's deep-sea manned submersible, Shen Hai Yong Shi, [delivered to the IDSSE in late 2017] to collect my own samples from three hydrothermal fields in the South-western region of the Indian Ocean. Since this first trip, I have now taken the deep-sea manned submersible six times and collected samples from various different deep-sea cold seeps, hydrothermal vents and deep basins. My interest in this field was really initiated in the MBL during the JUSTL programme."

"I am very grateful for my research experience in the MBL, which is one of the top research units in the field of marine science."

Dr Jing summed up her time in Woods Hole, "I am very grateful for my research experience in the MBL, which is one of the top research units in the field of marine science. What impressed me most was to see so many senior scientists attending the Friday night seminar and exchanging their opinions with junior investigators. This reminds me that life-long learning is the key to success, and I should invest time to continuously upgrade my skills and capabilities. I had always longed to study marine microbiology at the MBL ..[..] and thanks to the JUSTL programme, my dream came true. I really hope that I can go back to Woods Hole again someday to work with those outstanding scientists."

Dr Jason Wing-yiu KAN

Dr Jason Kan is a Pharmacokinetics Specialist in the Clinical Trials Centre at the University of Hong Kong. He obtained his PhD in 2015 from the Department of Applied Biology and Chemical Technology at The Hong Kong Polytechnic University in the laboratory of Prof. Larry Ming-cheung Chow. In his PhD research, he was involved in the development of a series of flavonoid dimers, a new family of chemical compounds. The ultimate goal of the project was to reverse multi-drug resistance in cancer cells by developing new drugs to target P-glycoprotein, one of the transporters that is related to drug resistance as it actively pumps drugs out of cells. Dr Kan characterised several of these flavonoid dimers via a drug metabolism and pharmacokinetics (DMPK) approach using pre-clinical animal models. By studying the absorption, distribution, metabolism and elimination (ADME) properties of these compounds, he showed that some of the flavonoid dimers could inhibit the intestinal P-glycoprotein in animals. The inhibition of intestinal P-glycoprotein significantly enhances the oral absorption of anti-cancer drugs and thus allows drugs initially developed for intravenous use to become orally available. This greatly improves the quality of life for cancer patients and facilitates the use of anti-cancer drug treatment.

Current Work

In The University of Hong Kong Clinical Trials Centre (CTC), Dr Kan works closely with the clinicians and study teams at Queen Mary Hospital who are conducting clinical trials. Blood samples from healthy volunteers recruited to test new drugs and generic drugs, are analysed in the CTC pharmacokinetics

Dr Jason Wing-yiu KAN is a Pharmacokinetics Specialist at the Clinical Trials Centre, The University of Hong Kong

laboratory. The content of the test drug in the blood is quantified and a pharmacokinetics profile is acquired. Dr Kan supervises a team of laboratory analysts to conduct the sample analysis by mass spectrometry, and then he is responsible for the subsequent pharmacokinetics analysis. Recent work generated from his team was used to support drug registration in China.

JUSTL Programme

Dr Kan participated in the 2014 JUSTL programme and worked on a couple of projects. In the first project, with Prof. Andrew L. Miller (The Hong Kong University of Science and Technology), he used the scanning vibrating electrode technique (SVET) to measure the electric fields around Gli1-induced skin tumours in *Xenopus laevis* embryos as a first step to investigate the role of potassium ion channels in the progression of skin cancer. He then worked with Dr Alessandro Rubinacci (San Raffaele Hospital, Milan, Italy) and Mr Alan Shipley (Applicable Electronics Inc., New Haven, CT), and used the scanning ion-selective electrode technique (SIET) to investigate the calcium ion currents generated around wounded bone.

Dr Kan really enjoyed his 8 weeks on the JUSTL programme. He told me that throughout his PhD he was working on pre-clinical translational research; however, at JUSTL he had the opportunity to work on a completely different project as he was conducting basic research to investigate how tumours form. This was the first time that he had worked with *Xenopus* as a model system. In addition, the sophisticated SVET and SIET equipment were all very new to him, and he spent a lot of time learning to master these techniques.

Dr Kan was especially inspired by a series of workshops that he attended for junior scientists, which provided advice about how to find their direction for their career. One workshop that stands out for him in particular, emphasized the importance of not just doing successful experiments and getting solid data, but also being able to manage a team of people in a laboratory environment. Following this talk, Dr Kan started to focus on getting some management experience, and he believes that this has helped him in the job he is doing today at The University of Hong Kong.

Dr Kan felt that all in all the JUSTL programme was amazing experience as it provided students from Hong Kong the opportunity to join a new community who are all focused on science. He said that “the atmosphere was great”, and that unlike at a conference where the topic might be very focussed, at the MBL scientists are working in a diverse range of scientific fields. Indeed, he believes that attending the JUSTL programme and talking to other people about their work, helped him find his niche in clinical and translational research.

Dr Jeffrey Jenkin KELU

Dr Jeffrey J. Kelu is a Research Associate in the laboratory of Prof. Simon Hughes in the Randall Centre of Cell and Molecular Biophysics, King's College London (London, UK). He obtained his MPhil and subsequently his PhD from the Division of Life Science, The Hong Kong University of Science and Technology, under the supervision of Prof. Andrew L. Miller. Dr Kelu’s PhD project involved investigating the role of two-pore channel type 2 (TPC2) in calcium signalling during slow muscle cell and primary motor neuron development in zebrafish embryos. During his PhD studies, Dr Kelu spent four weeks in Prof. Han Wang’s laboratory in the Center for Circadian Clock, Soochow University (Suzhou, China), where he learned the CRISPR/ Cas9-mediated gene knockout technique. In addition, he had a six-month overseas research attachment in Prof. Antony Galione’s laboratory in the Department of Pharmacology, University of Oxford, (Oxford, UK), where he learned biochemical assays for quantification of the calcium-mobilizing agent nicotinic acid adenine dinucleotide phosphate (NAADP).

Current Work

Dr Kelu is currently investigating the molecular mechanisms and genetic regulation of muscle development, and specifically how the circadian clock regulates muscle growth. He discovered that the signalling pathway that regulates protein synthesis is more active during the day than at night, and that the pathway that regulates protein degradation is upregulated more at night than during the day. Dr Kelu is especially interested in determining how the circadian clock regulates the turnover of proteins during muscle growth. He is still using the zebrafish as his model system as the embryos are transparent, which facilitates investigations of muscle development in the intact animal. It is also a particularly useful model for studying the circadian clock as nearly all the cells in the body are directly stimulated by light.

JUSTL Programme

Dr Kelu was a participant in the 2012 JUSTL programme. His mentors were Prof. Andrew L Miller and Dr Sarah E Ho (The Hong Kong University of Science and Technology) and for his JUSTL project, he conducted experiments to investigate the role of calcium signalling in the development of slow muscle cells. He describes his summer at the MBL as being a fascinating experience, meeting a lot of international researchers and providing an interactive holistic experience for research. He said that you could meet internationally acclaimed scientists walking down the corridor, in the cafeteria or in the dorms and so there were opportunities to talk about science all day and all night if you wanted to. He described the MBL as being very special, and really quite different from what he experienced in Hong Kong. He said that at the MBL, many people share the laboratory facilities, such as the microscopy facility and the zebrafish facility, so you have the opportunity to meet and interact with more people in these different facilities. Dr Kelu found it to be a very good experience to meet people who were doing the same sort of experiments to investigate different research topics.

"Dr Hershko shared with us his beliefs about being a good scientist." (Dr Kelu talking about the day he and a friend helped Dr Avram Hershko, 2004 Nobel Prize Winner for Chemistry, with his iPad).

Dr Kelu found the open lectures to be really interesting, especially those introducing new research models. However, Dr Kelu's most memorable event during his time at the MBL was the day he met Dr Avram Hershko, the Hungarian-born Israeli biochemist who was awarded the Nobel Prize for Chemistry in 2004 for his work on ubiquitin-mediated protein degradation. They met in the MBL cafeteria one day. Dr Kelu and his friend, AJ, saw an older man struggling to get his iPad working and without realising who it was, they offered to help him and then started to chat. Dr Kelu said, "We didn't talk about hard-core science, but Dr Hershko shared with us his beliefs about being a good scientist. He said that you always have to be curious, you have to be able to ask a good scientific question, and then design good experiments to test your hypothesis." Dr Kelu told me that Dr Hershko's advice is especially useful now that he is starting to write his own grant proposals.

Dr Kelu thinks that attending the JUSTL programme helped him to shape his career. Firstly, he learned from the lectures and by talking to other researchers that the zebrafish is one of the best animal models to use for research. Also, the JUSTL programme provided Dr Kelu with the first opportunity to work overseas. Since then he's had different opportunities to travel with work. He spent a month learning the CRISPR/cas9 technique in Prof. Han Wang's laboratory in Suzhou, then he worked in Prof. Antony Galione's laboratory in Oxford for 6 months, and of course now he is in London conducting post-doctoral research. He suggests that it is very important to gain international exposure and for him it expanded his horizons and emphasized the amount and quality of science being done overseas.

Dr Vincent Chun Wai KWAN

Dr Vincent Chun Wai Kwan is a Research Scientist working with Dr Yu-Chiun Wang in the Laboratory of Epithelial morphogenesis at the RIKEN Center for Biosystems Dynamics Research in Kobe (Japan). Dr Kwan obtained his MPhil in 2010 from The Hong Kong University of Science and Technology. He worked in the laboratory of Prof. King Lau Chow (Division of Life Science) and his project was involved in investigating the function of the *Mab21l2* gene in the development of the retina in the mouse. This gene is the mouse homologue of *mab-21,* which is known to play a key role in the specification of cell fate in the nematode *Caenorhabditis elegans*. After completing his MPhil degree, Dr Kwan went to the University of Chicago and undertook his PhD training in the laboratory of Dr Urs Schmidt-Ott in the Department of Organismal Biology and Anatomy. Dr Kwan obtained his PhD in 2017, and his project was involved in investigating the evolution of the extra-embryonic tissues in Diptera (two-winged flies). He demonstrated that differences in the extraembryonic tissue complexity can be explained by their distinct gradients of bone morphogenetic proteins (BMPs) and he elucidated the genetic mechanism that shapes these gradients.

Current Work

Dr Kwan started working in Dr Wang's laboratory in May 2017. He is continuing his research on flies, and is currently studying how in *Drosophila,* epithelial cells transform from being columnar to squamous (flattened) in shape during the differentiation of the extraembryonic tissues.

JUSTL Programme

Dr Kwan participated in the 2009 JUSTL programme. He worked with JUSTL Co-director, Prof. Robert Baker (New York University Medical School) on two projects investigating different aspects of zebrafish development. In the first project, Dr Kwan conducted experiments to analyse the function of the *Hox4b* gene in the development of the hindbrain, whereas in the second project he examined the migration of cells in the developing anterior trunk. Dr Kwan found that the experience he gained in several of the techniques he learned at the MBL, were useful for his MPhil project on his return to Hong Kong.

Like many of the other JUSTL participants, Dr Kwan also attended the *Embryology* course lectures. In his end-of-programme report, he said that he learned a lot of developmental biology and became more aware about the current progress in this field. "One thing that really struck me about the lectures was the amazing diversity of model organisms [that] scientists are currently using. In addition to the more conventional model organisms, such as the mouse or *Drosophila*, scientists [ ] were using organisms like choanoflagellates, ctenophore, cnidarians, amphipods, butterflies, flatworms, stickleback fish and bats to address many different kinds of questions in developmental biology." Indeed, Dr Kwan found that, "Talking with researchers and visiting their labs made me realize the diversity of life and the different modes of development. This experience stimulated my interest in how the diversity of life is created by developmental processes and encouraged me to pursue my study of evolutionary developmental biology."

This was Dr Kwan's first visit to the US and he said that while it was a culture shock, it also exposed him to the international science community. Indeed, he told me that, "During my stay, I met with students and scientists from around the world and learned more about their research. Talking with them gave me fresh insight about my own research." It was spending time at the MBL that encouraged Dr Kwan to go to the US for his PhD training.

Rowe Laboratory, where the JUSTL Laboratory was located

Dr Jacky Chun Kit KWOK

Dr Jacky Chun Kit Kwok is a Marine Conservation Officer at the Agriculture, Fisheries and Conservation Department (AFCD) in Hong Kong. He was awarded his PhD in 2015 in the laboratory of Prof. Put Ang Jr., in the Simon F.S. Li Marine Laboratory at the The Chinese University of Hong Kong, where he investigated the spatial and temporal signatures of heavy metals in a variety of Hong Kong corals (*Pavona decussata, Platygyra acuta, Porites lobate, Porites lutea and Acropora tumida*). He also conducted toxicology studies to investigate the effect of heavy metal and organic pollutants on different developmental stages of *P. acuta*. After completing his PhD, Dr Kwok was employed as a Lecturer in the Community College of City University, where he was responsible for teaching courses in the Environmental Studies programme as well as some General Education courses on topics such as Environmental Impact and Monitoring, and Nature Conservation in Hong Kong.

Current Work

Dr Kwok started work at the AFCD in early 2017. Since he began, he has been responsible for conducting a number of major marine ecological studies in Hong Kong. These include analysing the bleaching of corals and bioerosion, as well as studying the diversity of soft corals, octocorals, and reef fish in Hong Kong waters. Dr Kwok is also heavily involved in designing and launching various education programmes to promote marine biodiversity. These include the Hong Kong Marine Biodiversity Roving Exhibition, which has been consecutively launched in 2017-2019, and the production of a documentary on Hong Kong Marine Biodiversity. In addition, he is the leader of the AFCD Coral Working Group for Marine Biodiversity survey, which is responsible for the ecological monitoring of the coral communities in Hong Kong.

JUSTL Programme

Dr Kwok participated in the 2011 JUSTL programme. His mentor was Dr Ann Tarrant (WHOI), and he worked on a project with her to determine the expression of genes in the Starlet sea anemone (*Nematostella vectensis*) following exposure to polycyclic aromatic hydrocarbons (PAHs; found in crude oil) and UV light. It is known that PAHs from oil spills can persist in the environment and accumulate in the food chain, and it has been suggested that the toxicity of PAHs might be enhanced by UV irradiation. Dr Kwok used molecular biology techniques to investigate the expression of various different genes in adult *N. vectensis* exposed to UV and/or PAH treatment, and some of his data were subsequently published in *The Journal of Experimental Biology**.

In addition to his laboratory-based work, Dr Kwok also enjoyed the large number of lectures and seminars that were on offer "by renowned scientists worldwide." He found it amazing to learn from them about the behaviour, ecology and physiology of the different marine organisms.

Summing up his time in Woods Hole, Dr Kwok said that, "Spending two months in a fabulous institution, with good mentors and peers, was indeed a very effective and excellent opportunity for a post-graduate student to learn how to deliver quality research outcomes." In addition, he was especially thankful, "to Dr Ann Tarrant and her Post-Doc, Dr Adam M. Reitzel, for their willingness and patience to teach me everything in the lab as well as being good friends of mine." Indeed, Dr Kwok was surprised and happy to meet Dr Reitzel (who is now an associate Professor at The University of North Carolina at Charlotte, NC, USA) at a Gordon Research Conference held at The Hong Kong University of Science and Technology in 2018. He said, "I am so glad to see the people I met at WHOI again, and know they are continuing their hard work in the field of marine science."

With regards to the JUSTL programme, Dr Kwok said that although he is not working in marine science research anymore, he is very happy to be working as a Marine Conservation Officer at the AFCD. He believes that what he is doing now is highly relevant to his previous research, and that, "the mind-set,

vision and exposure built during the JUSTL programme are important assets that all helped to shape my career."

Tarrant, A.M., Reitzel, A.M., **Kwok, C.K., Jenny, M.J. (2013) Activation of the cnidarian oxidative stress response by ultraviolet radiation, polycyclic aromatic hydrocarbons and crude oil. The Journal of Experimental Biology 217:1444-1453.*

Dr Cora Sau Wan LAI

Dr Cora Sau Wan Lai is an Assistant Professor in the School of Biomedical Sciences at The University of Hong Kong. She obtained her PhD in 2009 from the Department of Anatomy at The University of Hong Kong in the laboratory of Dr Raymond Chuen Chung Chang, where she investigated how Aβ exerts its toxicity on neurons in Alzheimer's disease. After completing her PhD, she received her post-doctoral training in Prof. Wenbiao Gan's laboratory at the Skirball Institute of Biomolecular Medicine in the Langone New York University Medical Center, New York (USA) where she investigated synaptic plasticity in learning and memory using an innovative intravital imaging technique in an *in vivo* model.

Current Work

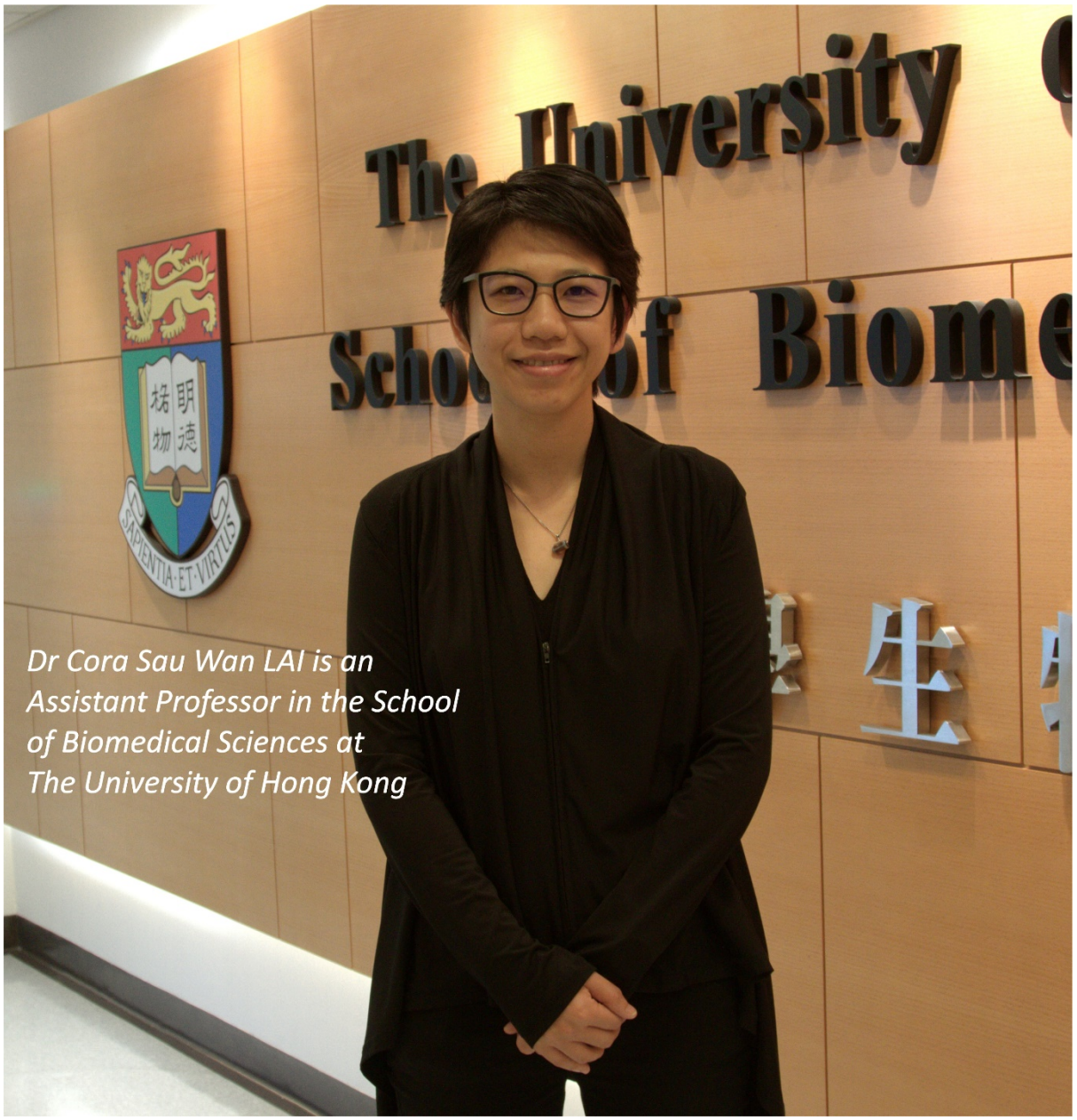
Since returning to The University of Hong Kong, Dr Lai continues the work she started during her post-doctoral training and investigates synaptic plasticity as well as neural circuits and the signal transduction pathways involved in learning memory, making use of imaging in an *in vivo* model. Her overall aim is to understand the how memory is stored in the neural circuits and the aetiology of a range of psychiatric disorders with pathology in dendritic spines, including schizophrenia, depression and autism spectrum disorder.

JUSTL Programme

Dr Lai joined the JUSTL programme in 2007. One the main reasons for applying to join the programme was that she discovered that many different microscope companies visit the MBL each summer to exhibit and promote their latest imaging equipment. As she had gained a lot of experience working with microscopes during her PhD research in Hong Kong, especially with the Zeiss 510 laser scanning confocal microscope, Dr Lai spoke with Mr Louie Kerr, (Director of Imaging Services at the MBL), and volunteered to be technical support for their Zeiss 510 system. It was during this time, when Dr Lai was working on the microscopy help desk, that she first met her post-doc mentor, Prof. Wenbiao Gan.

In addition to her confocal microscopy support work, Dr Lai also worked on several projects during her stay at the MBL. She worked mainly with the JUSTL Co-director, Prof. Robert Baker (New York University Medical School) on a project involved in exploring the distribution and migration of neurons during the development of the hindbrain in zebrafish larvae. However, she also spent time with the JUSTL Co-Director, Prof. Karen Crawford (St. Mary's College of Maryland) and learned to microinject squid embryos with the fluorescent calcium dye, calcium green-1. Finally, she helped to prepare aequorin mRNA for a collaborative project between Prof. Andrew L Miller (JUSTL Director, The Hong Kong University of Science and Technology) and Prof. Rodolfo Llinás (Department of Physiology and Neuroscience, NYU Medical School, New York, NY), which was injected into the squid giant axon.

"…a utopian research environment…it was awesome, a mixture of vacation, summer school plus exposure to another country and another culture."



Dr Cora Sau Wan LAI is an Assistant Professor in the School of Biomedical Sciences at The University of Hong Kong

Dr Lai attended a total of 55 lectures during the 8 weeks at the MBL and was excited to meet so many famous scientists, including Prof. Karl Deisseroth (Stanford University, Stanford, CA), who is known for his work in the field of optogenetics. This was a very memorable experience for Dr Lai. In addition, she found that at the MBL there was a very tight community of neuroscientists, especially from NYU. She found the whole environment to be very supportive, very interactive, and very friendly, and that even when people were not working in the same area, they were still very happy to communicate and talk to each other. Dr Lai says that she hadn't experienced the environment at the MBL, anywhere else, either when she was at NYU doing a post-doc or now that she is back in Hong Kong.

Dr Lai described the MBL as being a "utopian research environment…it was awesome, a mixture of vacation, summer school plus exposure to another country and another culture".

Dr Penny Pui Ying LAM

Dr Penny Pui Ying Lam is a Post-Doctoral Fellow in the laboratory of Prof. Randall Peterson in the Department of Pharmacology and Toxicology at the University of Utah. She graduated with an MPhil from the Department of Biology, The Hong Kong University of Science and Technology in 2007 where she studied the role of calcium signalling in early kidney development using zebrafish embryos as a model system. She then moved to the US, where she worked at Massachusetts General Hospital in Boston for 19 months as a Research Technologist, before starting her PhD studies at the University of Wisconsin-Madison. Dr Lam joined the Cellular and Molecular Biology graduate programme and worked in the laboratory of Prof. Anna Huttenlocher. Her PhD dissertation examined cell signalling and the regulation of the cytoskeleton during the migration of neutrophils and macrophages *in vivo,* again using zebrafish as her animal model.

Current Work

Working in Prof. Randall Peterson's laboratory at the University of Utah, Dr Lam continues to use zebrafish as they are highly suited to imaging due to their transparency during the first few days of development. Her current research involves discovering and developing novel chemo-optogenetic tools using an *in vivo* small molecule screening approach. Optogenetic/chemo-optogenetic tools and techniques have been developed over the last decade. This approach allows for the use of light to manipulate cell activities and biological processes with high spatial and temporal resolution. Dr Lam's work has resulted in the development of a tunable chemo-optogenetic system based on a high-conductance cation channel, zTrpa1b, coupled to photo-activatable channel ligands that include optovin and a number of its analogues. Using zebrafish embryos, Dr Lam has demonstrated that zTrpa1b/optovin can be used for the light-dependent activation of sensory neurons as well as the light-dependent manipulation of the heart beat rate. Eventually, Dr Lam would like to combine the chemo-optogenetic tools she is currently developing to investigate the signalling regulation of immune cells.

JUSTL Programme

Dr Lam was a PhD student when she joined the JUSTL programme in 2011. She contacted Drs Clare M Waterman and Robert Fischer (NIH National Heart, Lung and Blood Institute) who she knew were also interested in elucidating the role of the cytoskeleton in the migration of cells, and they became her JUSTL mentors. During her time at the MBL, Dr Lam used high-speed spinning disk confocal microscopy to investigate F-actin dynamics and actomyosin contraction during pseudopod retraction in migrating neutrophils. After the JUSTL programme ended, Dr Lam (and Prof. Huttenlocher) continued the collaboration with Drs Waterman and Fischer, and published several papers together.

Dr Lam says that the JUSTL programme was "a great experience because it was a very friendly, encouraging, and diverse environment for science….I was immersed in a wide range of science through attending open lectures such as from the *Physiology* course, Embryology course and Friday Evening Lectures series…I was able to meet many scientists from different fields….. At the same time, I did experiments, which eventually led to several publications. So, overall I found it to be an eye-opening experience."

"..the interaction and discussions of science and non-science-related topics with students from all over the world [..] were very stimulating and enjoyable."

In addition to keeping in touch with her mentors, Dr Lam has kept in contact with several other people who she met during her time at the MBL, especially people who she met when she attended the *Physiology* course lectures. In fact, she just recently met up with two of these scientists in Utah. In addition, she meets old friends at conferences, and she attended an MBL reunion during a recent ASCB meeting, so Dr Lam found the JUSTL programme to be great for networking.

During the Physiology classes, there was an introduction to different types of microscopy, and the students had the opportunity to try different microscopes and other equipment. With this hands-on experience, Dr Lam found that the spinning disc confocal microscope was particularly suited to the research that she was doing for her PhD studies where she was imaging highly motile immune cells *in vivo*. Prof. Huttenlocher subsequently acquired a spinning disc confocal microscope for her own laboratory, and Dr Lam helped her select the best system to purchase for their experiments. Furthermore, three articles describing work that resulted from the collaboration initiated during the JUSTL programme were published in *Developmental Cell**, *Developmental Biology*** and *Methods in Molecular Biology****.

Overall, Dr Lam found the JUSTL programme to be a fantastic experience. In the report prepared at the end of her time at the MBL, she wrote that "the interaction and discussions of science and non-science-related topics with students from all over the world [..] were very stimulating and enjoyable" and "renowned scientists with different expertise gave lectures every day on various topics and shared with us their insights into various biological problems [..] it was an excellent working and learning environment."

Tsai TYC, Collins SR, Chan CK, Hadjitheodorou A, **Lam PY, Lou SS, Yang HW, Jorgensen J, Ellett F, Irimia D, Davidson MW, Fischer RS, Huttenlocher A, Meyer T, Ferrell JE Jr, Theriot JA. (2019). Efficient front-rear coupling in neutrophil chemotaxis by dynamic myosin II localization. Developmental Cell. 49(2):189-205.*

***Fischer RS, **Lam PY**, Huttenlocher A, Waterman CM. (2019). Filopodia and focal adhesions: An integrated system driving branching morphogenesis in neuronal pathfinding and angiogenesis. Developmental Biology 451(1):86-95. doi: 10.1016/j.ydbio.2018.08.015.*

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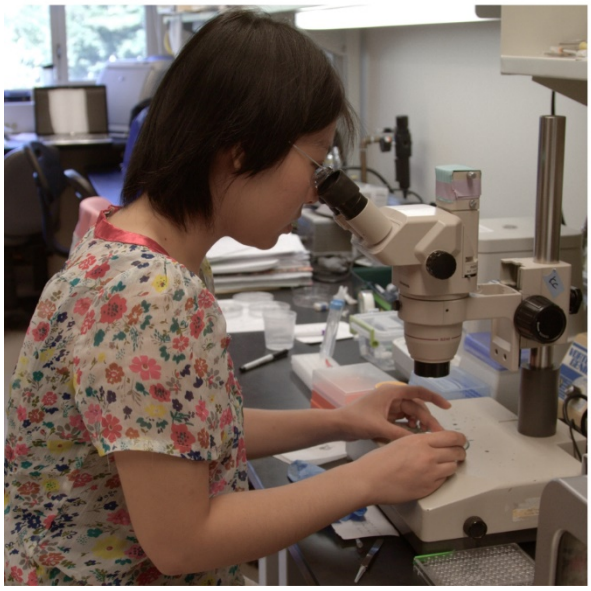
Ms Connie Pui Ling LAU

Ms Connie Pui Ling Lau is a Fisheries Officer in the Agriculture, Fisheries and Conservation Department (AFCD). She completed her MPhil degree in 2011 in Prof. Put Ang Jr.'s laboratory in the Simon F.S. Li Marine Science Laboratory at The Chinese University of Hong Kong. Her MPhil project involved investigating the reproductive cycle of the black coral (*Antipathes curvata*) in Hong Kong waters. After



The research component of the JUSTL programme. Top to bottom: Chi Wai Lee, Jeffrey Kelu and Mana Yung running experiments in the laboratory during the summer of 2012.

her MPhil degree, Ms Lau worked in a consultancy company for 3 years, before she started working at the AFCD.

Current Work

Ms Lau has worked at the AFCD since 2015. She is involved in overseeing and working on a number of ecological monitoring and education programs related to the marine parks in Hong Kong.

JUSTL Programme

Ms Lau participated in the 2009 JUSTL programme, and she was mentored by Dr Scott Lindell (now in the Department of Applied Ocean Physics and Engineering, WHOI) and Dr. Nagwa Mohammady (Department of Botany and Microbiology, Alexandria University, Alexandria, Egypt). She worked on a project to determine the most efficient methods for preparing biodiesel from algae. She tested nine different strains of microalgae and investigated various culture methods in order to determine which species and which culture conditions were the optimal for the production of biodiesel. Ms Lau told me that, "I was very lucky to be able to work as intern under Dr. Scott Lindell and Dr Nagwa Mohammady. The field was completely new for me but with their supervision I could pick things up very easily." Indeed, data that Ms Lau collected were subsequently published in *Energy and Fuels** and in the *Research Journal of Phytochemistry***.*

In addition, to working on her project, Ms Lau also worked as an intern in the Marine Resources Center (MRC) at the MBL. In her end-of-programme report, Ms Lau said that, "I was proud to be one of the lucky interns in the MRC. Before we even began our daily experiments, we had to perform a series of daily duties beginning at 7:30 am with cleaning the many animal-holding tanks in the facility. Mondays, Wednesdays and Fridays were also fish-feeding days. Carrying out these duties allowed me to meet and get to know many of the other MRC interns who came from all over the USA." Ms Lau is also especially appreciative of the support provided by Dr Omi Ma and the friends she made in Dr Lindell's laboratory.

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***Mohammady NGE, Rieken CW, Lindell SR, Reddy CM, Taha HM, **Lau CPL**, Carmichael CA (2012). Age of nitrogen deficient microalgal cells is a key factor for maximizing lipid content. Research Journal of Phytochemistry 6: 42-53.*

Dr Edward Tak Chuen LAU

Dr Edward Lau obtained his PhD from the School of Biological Sciences at The University of Hong Kong. He then continued to work at The University of Hong Kong, first in the Freshwater Ecology and Conservation Laboratory, working on a project on wetland biodiversity and ecosystem services, and then he worked on a coastal rehabilitation project.

Current Work

At the end of 2018, Dr Lau started working in the Agriculture, Fisheries and Conservation Department, HKSAR as an Endangered Species Protection Officer, where his main focus now is on the international trade in plants.

JUSTL Programme

Dr Lau attended the 2013 JUSTL programme. His mentor was Dr Marko Horb, Senior Scientist and Director of the National *Xenopus* Facility at the MBL. Dr Lau created two transgenic lines of *Xenopus laevis* (African clawed frog) during his time at the MBL. Both lines were engineered to express the protein part of the bioluminescent reporter, aequorin, which generates light in the presence of calcium ions. One line expressed aequorin in all the cells whereas the other line expressed the reporter specifically in the neural cells.

"I enjoyed the freedom and intellectual exchange at Woods Hole.

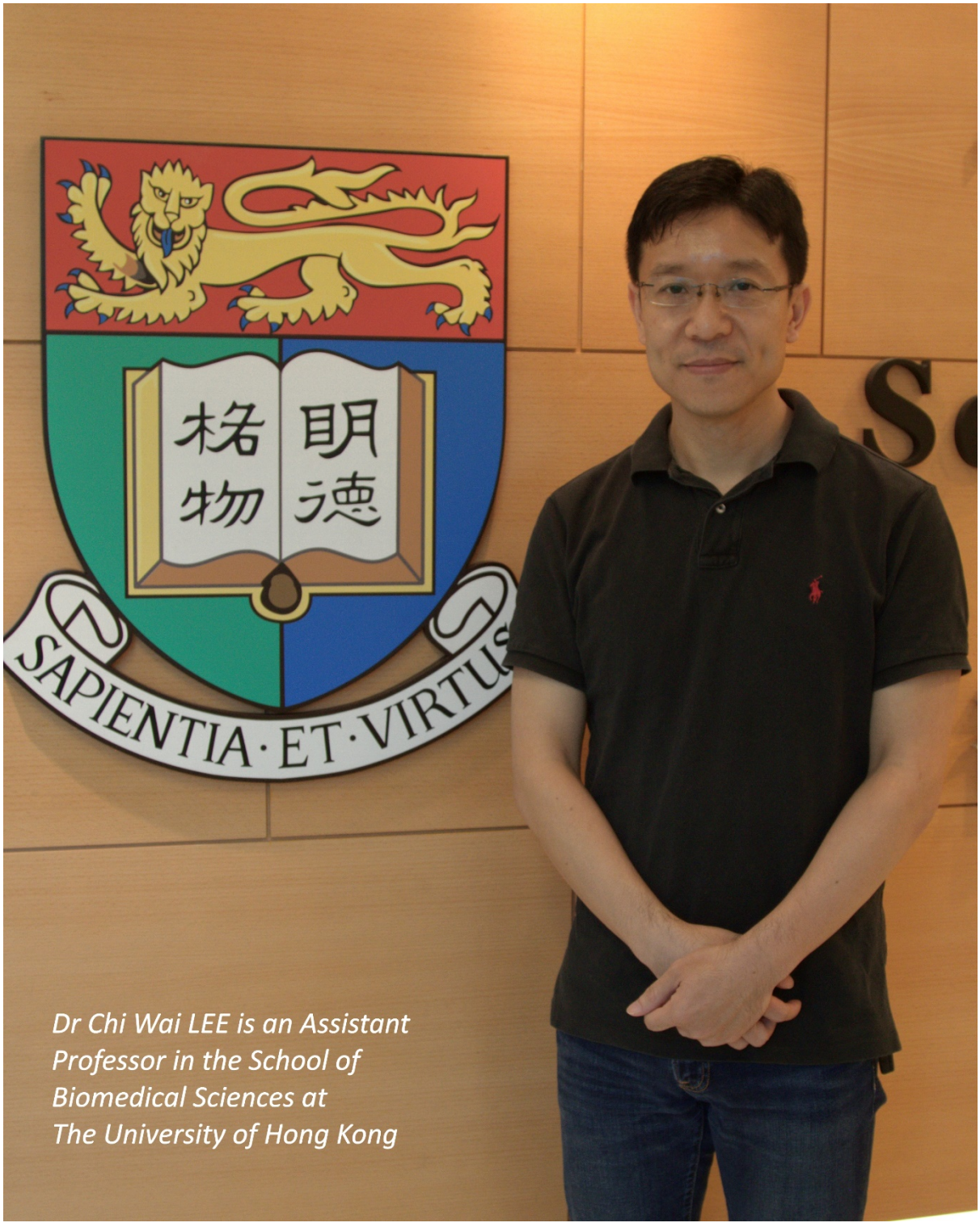
Dr Lau considers his time at the MBL as "a breath of fresh air to my research life in Hong Kong. The environment was beautiful and I enjoyed the freedom and intellectual exchange at Woods Hole." While Dr Lau did not keep in touch with his JUSTL mentor, he is still in contact with the other JUSTL participants from his year and the research assistants in the lab where he worked. One event that stood out for Dr Lau was the 'Happy Hour'. This event took place every Friday afternoon, starting at around 4:00 pm, and it gave people from the various laboratories (who were mainly visiting from different parts of the world), the opportunity to get together for a drink and to have a chat about science as well as learning about each other's cultures. "It was not only about having a good time, but also about creating an amiable environment for people in different research teams to mingle and exchange ideas." Dr Lau said that he was inspired by having the opportunity to talk to people and finding out about different research areas. All in all, he found the JUSTL programme to be a "remarkable experience".

Dr Chi Wai LEE

Dr Chi Wai Lee has been an Assistant Professor in the School of Biomedical Sciences at The University of Hong Kong since 2015. He obtained his PhD in 2005 in the laboratory of Prof. H. Benjamin Peng in the Division of Life Science and State Key Laboratory of Molecular Neuroscience at the The Hong Kong University of Science and Technology. There, he studied the clustering and function of mitochondria during presynaptic development in the neuromuscular junction using *Xenopus laevis* (African clawed frog) as the model system. After obtaining his PhD and with support from the Croucher Foundation, Dr Lee received his post-doctoral training first at Rutgers University (New Jersey) and then at Emory University (Atlanta, Georgia) in the US. He returned to The Hong Kong University of Science and Technology briefly as a Research Assistant Professor in Prof. Peng's laboratory, before taking up the position of Assistant Professor at the National University of Singapore.

Current Work

At The University of Hong Kong, Dr Lee's current research is focussed on the signal transduction pathways and cytoskeletal changes that occur during the development, disease and regeneration of synapses, using the neuromuscular junction (nerve/muscle synapse) as a model. He is interested in investigating how cytoskeletal proteins such as actin and tubulin can regulate vesicular trafficking of different proteins and organelles. He is especially interested in determining how the acetylcholine receptor, which is the major receptor of the neuromuscular junction can be inserted into membranes and how they are organised to form clusters. He does a lot of live cell imaging to visualize vesicular trafficking and cytoskeletal rearrangements as well as surface tracking of individual receptors on the cell membrane.



Dr Chi Wai LEE is an Assistant Professor in the School of Biomedical Sciences at The University of Hong Kong

JUSTL Programme

Dr Lee attended the JUSTL programme in 2012 when he was a Research Assistant Professor at The Hong Kong University of Science and Technology. Due to his seniority, Dr Lee worked on his own project for much of his time at the MBL but he also spent time in the laboratory of Dr Scott Brady (University of Illinois at Chicago). Dr Brady is an expert in axonal transport and Dr Lee gained experience using the giant axon of the longfin inshore squid (*Doryteuthis pealei*) to investigate how microtubules and other motor proteins regulate axonal transport cargoes. He used video microscopy to visualise the anterograde and retrograde transport of different organelles and cargoes along microtubules. Dr Lee and Dr Brady still keep in touch during scientific conferences such as the American Society of Cell Biology (ASCB) and the International Society of Neurochemistry (ISN) meetings.

Dr Lee was also particularly enthusiastic about spending time at the MBL because of the world-class National *Xenopus* Resource (NXR), which had recently opened (in 2011) and which provides a platform for generating and maintaining transgenic lines of *Xenopus laevis* and *Xenopus tropicalis* as well as providing stock to the *Xenopus* research community. Indeed, Dr Lee is very grateful to the NXR Director, Dr Marko Horb, for giving him access to one of the first transgenic lines of *Xenopus laevis* that was developed, which expresses Venus-YFP (yellow fluorescent protein) in most of the cells of the body. Dr Lee used this transgenic line for a pilot project where he investigated the earliest interaction between nerve and muscle cells during the formation of the neuromuscular junction.

Dr Lee summed up his time on the JUSTL programme as being a “wonderful experience”. He learned a lot from top scientists both from attending their lectures and interacting with them during social activities. In addition, because he was given the opportunity to conduct independent research at the MBL, he believes that the experience away from his home institution really helped to shape and train his independence, which was a key factor in the development of his career.

Dr Karen Wing Man LEE

Dr Karen Wing Man Lee obtained her MPhil and PhD in the laboratory of Prof. Andrew L. Miller (The Hong Kong University of Science and Technology) where she studied the role of Ca^{2+} signaling during fertilization and the early cleavage stage in zebrafish embryos. In 2004, she was awarded a Croucher Foundation Fellowship to work in the laboratory of Dr Marc Moreau (Université Paul Sabatier, Toulouse, France) where she investigated neural induction in developing *Xenopus laevis* embryos. After finishing in Toulouse, she worked in the Université Pierre et Marie Curie in Paris in the laboratory of Dr Marie-Hélène Verlhac. She then spent a short time in RIKEN Center for Developmental Biology in Dr Antony Perry’s laboratory before moving back to France, this time to The Villefranche-sur-mer Developmental Biology Laboratory where she worked with Dr Alex McDougall. She has since left science and runs her own business in Cannes in the South of France.

JUSTL Programme

Dr Lee attended the 2010 JUSTL programme. Because she was one of the more mature JUSTL participants, she worked on her own project. This involved using a proteomic approach to identify and characterize novel proteins that might play a role during meiosis in the ascidian species *Ascidella aspersa*. She tested several chromosome-associated protein candidates to determine their

“..I had the opportunity to meet many scientists from all over the world as well as attend the lectures organized by the MBL.”

expression and localization in ascidian oocytes before going on to characterize the involvement of these proteins during meiosis in a mammalian model.

When I asked Dr Lee how she would describe her experience on the JUSTL programme, she told me: "The MBL is a renowned international marine research institute. During my stay [ ], I had the opportunity to meet many scientists from all over the world as well as attend the lectures organized by MBL (e.g., the Friday night lectures and the *Embryology* and *Physiology* summer course lectures)."

Dr Lee said that she was helped and inspired by a number of people at the MBL. She said that she was new to the ascidian field. However, Dr Karen Crawford (JUSTL programme Co-director), introduced her to an ascidian expert, Dr William Jeffery (University of Maryland), whose laboratory was across the corridor from the JUSTL laboratory. "Dr Jeffery took me out to collect ascidians in Woods Hole and he gave me a lot of advice during the initial setup of my ascidian colony." Dr Lee is also very grateful to Mr Eric Karplus (ScienceWares, Inc.) who custom-designed a microinjection platform within two days of her arrival at the MBL, to suit her microinjection requirements. She is also grateful to a colleague from Villefranche-sur-mer, Dr Jenifer C. Croce, who introduced her to Dr Robert Zeller (California Institute of Technology), the instructor of the ascidian module of the *Embryology* course, who gave her useful advice on ascidian *in-vitro* fertilization and sample collection.

Dr Lee found that the JUSTL programme gave the participants invaluable international exposure, and provided them with "an opportunity to meet many experts in our field and have a chance to discuss with them our research." She said that they were able to visit different laboratories to find out how other scientists do their research. She believes that working in Woods Hole for 8 weeks was an inspiring time for all the JUSTL participants.

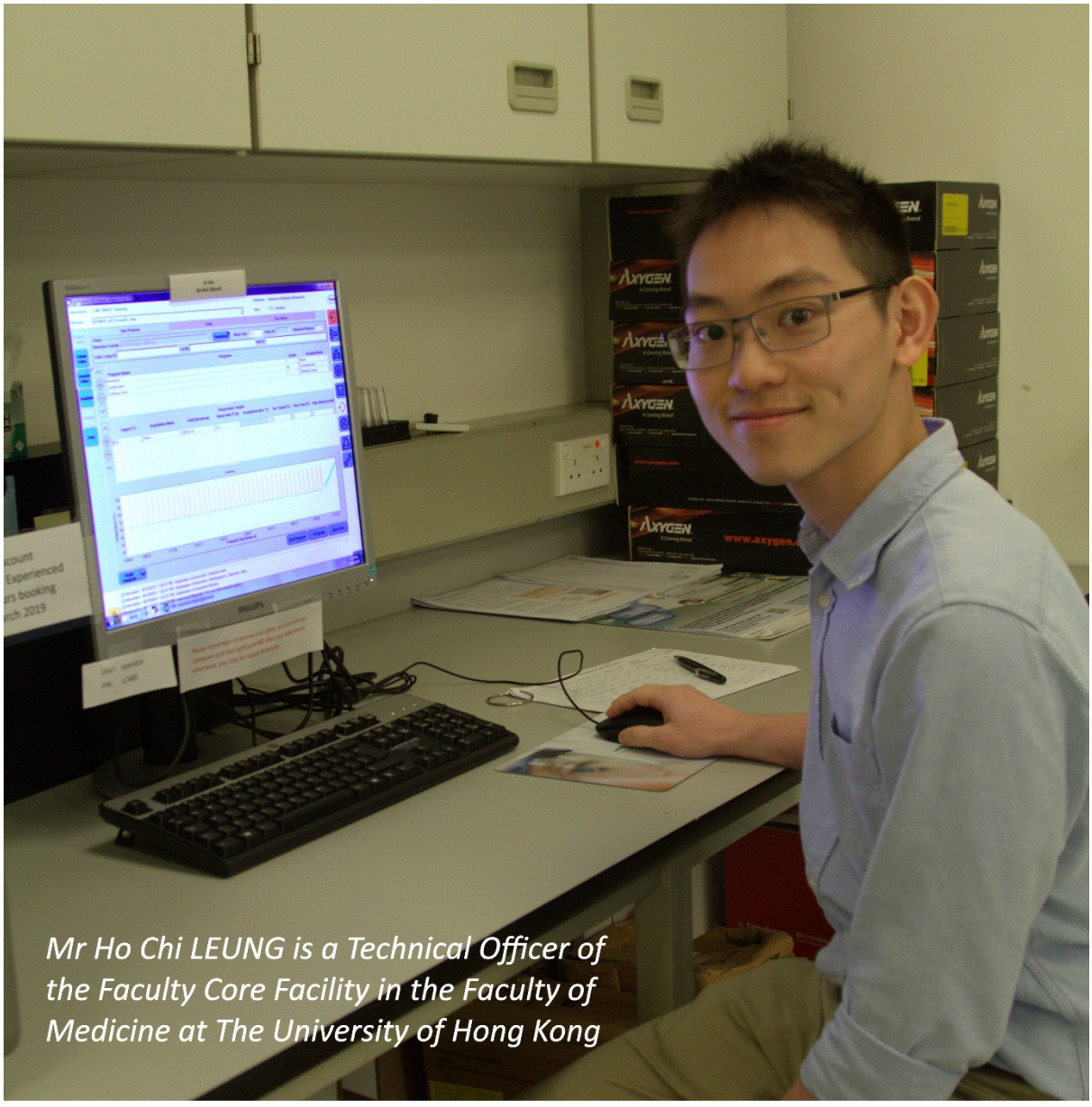
Mr Ho Chi LEUNG

Mr Ho Chi Leung is a Technical Officer in the Faculty Core Facility in the Li Ka Shing Faculty of Medicine at The University of Hong Kong. He obtained his MPhil from the Division of Life Science, The Hong Kong University of Science and Technology, under the supervision of Prof. Andrew L. Miller. Mr Leung's MPhil project involved exploring the contribution made by transmembrane ion fluxes to the regulation of neural induction in *Xenopus laevis* embryos. After finishing his MPhil, Mr Leung moved to The University of Hong Kong where he worked for two years in the Hereditary Gastrointestinal Cancer Genetic Diagnosis Laboratory in the Department of Pathology at Queen Mary Hospital, before transferring to the Faculty Core Facility.

Current Work

Mr Leung is in charge of the molecular biology and liquid dispensing equipment in The University of Hong Kong Faculty Core Facility. He trains researchers how to use the various machines and coordinates with the service engineers for general maintenance and when there is a problem. He is also responsible for managing the distribution of reagents used by the various pieces of equipment, to the users, and he performs various quality control checks on the new equipment, to confirm that they are optimized for users' experiments. Mr Leung also looks after two imaging systems for the whole slide scanning of histological specimens.

Mr Leung is also continuing with his studies. He has just completed the first year curriculum of a two-year course called Medical Laboratory Science. This training will qualify and license him to become a Medical Technologist in a public or private hospital for working with clinical samples.



Mr Ho Chi LEUNG is a Technical Officer of the Faculty Core Facility in the Faculty of Medicine at The University of Hong Kong

JUSTL Programme

Mr Leung was a participant in the 2014 and 2015 JUSTL programmes. He was mentored by Prof. Andrew L. Miller (The Hong Kong University of Science and Technology) and Dr Marko Horb (National *Xenopus* Resource, MBL) during both years, and in 2014 he was also mentored by Mr Alan Shipley (Applicable Electronics, New Haven, CT, US) and Prof. Raymond Keller (University of Virginia, US). In 2014, Mr Leung used the scanning vibrating electrode technique (SVET) and scanning ion-selective electrode technique (SIET), with equipment designed and built by Mr Shipley, to map the extracellular currents and calcium fluxes, respectively, around *Xenopus laevis* embryos during neural induction. He was also taught how to prepare Keller explants from *Xenopus* embryos by Prof. Raymond E Keller (University of Virginia, US), who pioneered the use of this technique. Mr Leung was very impressed that Prof. Keller made all his own tools for preparing the explants too. During his second visit to the MBL in 2015, Mr Leung worked in the NXR at the MBL where he screened the lines of *Xenopus* (which had been prepared by Dr Edward Lau during the 2013 JUSTL programme) to identify transgenic individuals that expressed green fluorescent protein (GFP) and bioluminescent apoaequorin either throughout the body or just in the brain.

In addition to working on the various research projects, Mr Leung also attended many lectures held at the MBL. He was especially interested in the *Embryology* course lectures. There are several lectures that Mr Leung still remembers clearly, including one by Dr Richard Behringer (The University of Texas MD Anderson Cancer Center, Houston, TX), who described the differentiation of the gonads and reproductive tract during embryogenesis in the mouse, and another by Dr Alejandro Sanchez Alvarado (Stowers Institute for Medical Research, Kansas City, MO), who discussed the regenerative capabilities of the planarian flatworm. Another talk that Mr Leung found to be especially fascinating was presented by Dr Jack Gilbert (now at the University of California San Diego, US) who spoke about 'The Invisible Influence of the Microbiome'. Mr Leung recalls that he was "quite surprised to find out that different microbes in our body can actually play a role in our physiological and mental development and even in our social behaviour."

Mr Leung firmly believes that in addition to helping him with his MPhil studies, the JUSTL programme provided him with additional knowledge that was useful for his work with cancer cells during his time in the Department of Pathology at The University of Hong Kong, as well as most recently in The University of Hong Kong Faculty Core Facility.

Dr Raymond Kwan Keung LEUNG

Dr Raymond Kwan Keung Leung has just started his Senior Residency training in Psychiatry in Tai Po Hospital. He obtained his PhD degree in 2010 from the Department of Physiology at the Chinese University of Hong Kong under the supervision of Prof. Po Sing Leung, where he investigated the effect of hyperglycemia on the expression of the angiotensin II type 1 receptor and on the secretion of insulin in pancreatic β-cells. In addition, he demonstrated that the angiotensin II type 2 receptor regulates pancreatic endocrine cell development using a human stem cell model. After finishing his PhD, Dr Leung decided to continue his education and he started medical school, again at The Chinese University of Hong Kong. He finished his basic medical degree in 2015, and followed this with a year of internship training in different specialties, after which he started 3 years junior training in Psychiatry.

Current Work

During the three years of his Senior Residency, Dr Leung will be specializing in General Adult Psychiatry, treating people between the ages of 18 to 65 years. He first experienced psychiatry during

Dr Raymond Kwok Keung LEUNG is a Senior Resident in Training in Psychiatry at Tai Po Hospital

his 4th year of medical school when he had a 2-month attachment in a mental health hospital. He realised at that point that many of the patients had fewer opportunities to get good medical care such that when they described physical complaints, these were assumed to have been fabricated due to their mental disabilities. Dr Leung described these people as being under-privileged in the medical system and, wanting to make a difference and help them, he decided to specialise in psychiatry. Dr Leung also believes that in psychiatry, there is a greater capacity for research especially with regards to understanding the disorders and for developing new treatments and therapies.

JUSTL Programme

Dr Leung participated in the 2008 JUSTL programme. He was mentored by one of the JUSTL Co-directors, Dr Karen Crawford (St. Mary's College of Maryland), and he worked with her on a project investigating different aspects of the development of the long-finned squid, *Doryteuthis pealei*. Dr Leung commented that the JUSTL programme gave him a unique opportunity to conduct scientific research and try new techniques without the stress experienced by most if not all graduate students of having to collect publication quality data. In his end-of-programme report, Dr Leung described Dr Crawford as being "a passionate scientist, an energetic teacher and a good friend. She taught me how I should enjoy life with science." He also said that: "The MBL….is a great platform for knowledge interflow" and "I start to understand why so many worldwide scientists move to Woods Hole every [summer]; it is an amazing place for sharing science." Dr Leung said that during his two months at the MBL, he got to make friends not just with the other JUSTL participants but also with some of the local students. Indeed, one American student who they became friends with, subsequently came to Hong Kong and was an exchange student at The Chinese University of Hong Kong for several months.

"[She is] a passionate scientist, an energetic teacher and a good friend. She taught me how I should enjoy life with science." (Dr Leung about his mentor, Dr Karen Crawford).

When I asked Dr Leung if participating in the JUSTL programme helped to shape his career, he replied definitely yes. He told me: "I remember one day in the JUSTL programme I was struggling to decide whether to go to medical school or to continue my life doing research as a post-doc. I wanted to have a more clinical approach to my research. I talked about this with Karen [Crawford] and she told me to imagine what I wanted to be doing in 10 years' time. That was the time that I realized that I really wanted to become a medical doctor." Dr Leung has not completely discounted working in research again though. He mentioned that given the opportunity, and given his experience in psychiatry, at some point he would be interested in conducting research in the field of neuroscience.

Dr Leung finished by telling me that having the chance to spend two months away from Hong Kong at the MBL and interacting with scientists from all over the world gave him a lot of ideas and allowed him to take a step back to think about what he wanted to do with his life.

Dr Maggie Wai Ming LI

Dr Maggie Wai Ming Li is a Research Associate in Prof. Chow Lee's laboratory in the Department of Biochemistry and Molecular Biology at the University of Northern British Columbia, Canada. She obtained her PhD in 2002 in the laboratory of Dr Marcel Bally at the Department of Pathology and Laboratory Medicine, Faculty of Medicine, University of British Columbia, where she conducted research on the use of liposomes as a delivery system for cancer vaccines. After finishing her PhD, Dr Li was a post-doctoral fellow in Prof. David Banfield's laboratory (Division of Life Science, The Hong

Kong University of Science and Technology) working on protein trafficking in the budding yeast, after which she took on a position in Prof. Andrew Miller's lab first as a Visiting Assistant Professor and then as a Research Associate.

JUSTL Programme & Current Work

Dr Maggie Li was one of the more senior JUSTL participants when she attended the programme in 2013. For this reason, she did not have a mentor, but worked on her own project, making use of the superior microscopy facilities at the MBL. Indeed, research that she initiated during her time at the MBL yielded some very exciting results and she is still working on aspects of the project today.

Dr Li's project at the MBL involved imaging small RNAs in zebrafish embryos during their early development. She visualized these small RNAs with molecular beacons, which are small RNA molecules that have a complementary sequence to the RNA of interest. Molecular beacons generate fluorescence when they are hybridized to their target RNA, and in this way the localization of different RNAs can be tracked in live normally developing embryos. Since her time at the MBL, Dr Li discovered that molecular beacons are a very powerful tool to inhibit microRNAs in zebrafish during early development, and she has recently begun to explore the possibility of using molecular beacons as specific inhibitors for different types of RNA in other model systems such as in mammalian cells.

"It was a great chance to learn top-notch science and to meet great people in the field."

Regarding her JUSTL experience, Dr Li really treasures the opportunity she was given to go to Woods Hole to work on her research. "It was a great chance to learn top-notch science and to meet great people in the field. The most memorable experience was to work with a light sheet microscope [new technology at the time] and with people who shared the same passion. I remember working late into the night and chatting with others about their projects with such enthusiasm and high spirit. There was one person who was also working late at night trying to capture some amazing images in the microscope facility. It turned out that he was not using a commercial microscope, but he actually built the microscope himself. What also amazed me was that under such a friendly and highly motivated environment where everyone was so engaged and passionate about their project, I could not tell whether the person was a PI, post-doc or a student. It was truly an amazing experience."

Ms Clare Hau In LUN

Ms Clare Hau In Lun is a Visiting Scholar in Prof. Stanley Lau's laboratory in the Department of Ocean Science at The Hong Kong University of Science and Technology. She completed her MPhil (Marine Environmental Science) in 2016, again in Prof. Lau's laboratory. For her MPhil project, she investigated the population dynamics and community structure of bacteria as they undergo habitat transition from an animal host to a subtropical marine sediment. At the same time as conducting her MPhil research, Ms Lun worked for the Agriculture, Fisheries and Conservation Department as a Fisheries Management Officer; she was involved in licensing, enforcement and liaison issues related to the fisheries industry in Hong Kong. Ms Lun told me that, "This position gave me the opportunity to connect and communicate with some local fishermen and mariculturists, as well as fisheries experts, so I gained a lot of experience in this job."

Ms Clare Hau In LUN is a Visiting Scholar in the Department of Ocean Science at The Hong Kong University of Science and Technology

Current work

Ms Lun has been a Visiting Scholar in Prof. Lau's laboratory since 2017. Her current work is related to her MPhil research project, and she is involved in microbial source tracking fecal pollution in the marine environment. In the near future, she will also be involved in a new project, in which she will be investigating microbes in the fisheries environment. She will investigate various aspects of the local fisheries industry using a variety of microbiology and molecular biology techniques.

JUSTL Programme

Ms Lun was a participant in the 2011 JUSTL programme. She was mentored in part by Prof. Stanley Lau who also attended the JUSTL programme as a senior participant, and in part by Dr Scott Lindell (Marine Resources Center, MBL). Ms Lun worked on a project to compare the genetic diversity of *Escherichia coli* bacteria in two locations in Woods Hole, Eel Pond and Stoney Beach. *E. coli* is a sub-group of coliform bacteria as they are present in the digestive system of animals and therefore are also found in their excreta. The presence of such fecal bacteria is therefore generally used when monitoring the amount of fecal pollution in water resources, including shellfish harvest sites. Ms Lun measured the abundance of this bacterium over the 8-week period that she was in Woods Hole, and compared the genetic diversity of the bacteria collected from Eel Pond (more heavily contaminated) and Stoney Beach (a more pristine environment). She also studied the abundance of bacteriophages, viruses that infect bacteria and thus can transmit DNA between species, at these two sites.

In addition to her research project, Ms Lun attended the lectures of the *Microbial Diversity* course. In their joint end-of-programme report, Prof. Lau and Ms Lun said, "These lectures have given Clare some ideas about her research in Hong Kong, and Stanley some inspirations in his teaching methods." Ms Lun especially remembers one of the Friday evening lectures, where the speaker described the prediction of salmon production through investigating the oil content in copepods, which are small crustaceans found in almost all aquatic habitats. Ms Lun found this lecture very interesting, and indeed it inspired her to learn more about the fisheries field for her career.

Ms Lun told me that she really enjoyed her experience on the JUSTL programme: "It was awesome because it allowed me to explore various different fields in biology related to the marine environment."

Dr Katherine Yueping QIAN

Dr Katherine Yueping Qian is a Senior Clinical Manager at Intuitive Surgical-Fosun Medical Technology (Shanghai) Co. Ltd in Shanghai, China. She obtained her PhD in 2008 from the The Hong Kong University of Science and Technology Department of Biology working in the laboratory of Prof. H. Benjamin Peng on the development of the neuromuscular junction and the role of protein tyrosine phosphatases in this process. After completing her PhD studies, Dr Qian moved to Shanghai where she worked in various pharmaceutical and biotech companies, including GlaxoSmithKline, Life Technologies and Beckman Coulter, before starting at Intuitive Surgical-Fosun Medical Technology (Shanghai) Co. Ltd. in early 2018.

Current Work

Intuitive Surgical-Fosun Medical Technology (Shanghai) Co. Ltd. is a joint venture between the Chinese company Fosun Pharma and Intuitive Surgical, which is an American company who created the da Vinci Surgical Robot system. The da Vinci system facilitates surgeons when they perform complex surgical procedures in a minimally-invasive manner. This system has been used in the US since 2000. As Senior Clinical Manager, Dr Qian is involved in all the clinically-based tasks required to get the

products accepted for use in China. Thus, she conducts clinical trials and evaluates clinical research described in the literature to demonstrate the products performance and safety.

JUSTL Programme

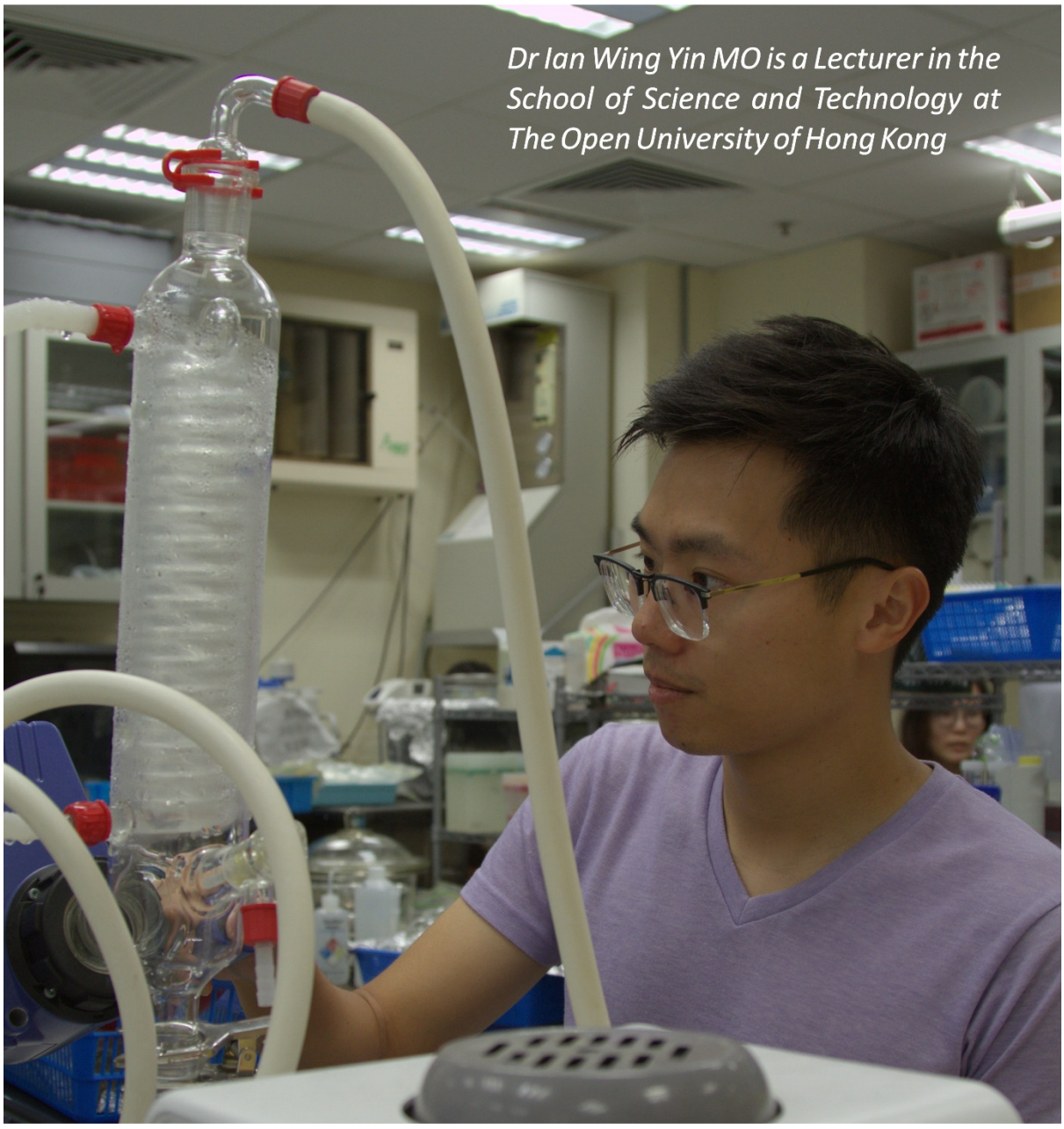
Dr Qian was a participant in the 2007 JUSTL programme. During her 8 weeks at the MBL, she worked with Dr Mark Terasaki (University of Connecticut Heath Center, Farmington, CT), Dr Steve Zottoli (Williams College, Williamstown, MA), and Dr Joshua Zimmerberg (National Institutes of Health, Bethesda, MD). In Dr Terasaki's laboratory, she learned how to microinject and image starfish oocytes and she confirmed his previous observations regarding the initiation of nuclear envelop breakdown. Working with Dr Zottoli, Dr Qian learned some basic electrophysiology and used this technique identify the receptive region of supramedullary cells in the cunner fish (*Tautogolabrus adspersus*). Finally, Dr Qian got a chance to work with Dr Zimmerberg after hearing him speak at a Neuroimaging seminar. She introduced herself and discovered that he was running experiments on single molecule tracking of the acetylcholine receptor. As this was related to the work she was doing for her PhD, Dr Zimmerberg invited her to get involved in his project. Dr Qian really appreciated the opportunity to work with these three world-renowned scientists on their different projects.

"The scientific atmosphere in MBL impressed me a lot. I saw people build connections, collaborate with each other and inspire each other with great ideas."

In her end-of-programme report, Dr Qian said that: "The scientific atmosphere in MBL impressed me a lot. I saw people build connections, collaborate with each other and inspire each other with great ideas. It was an amazing experience to live and work with so many intelligent scientists." When I spoke with Dr Qian recently, she revealed that the JUSTL programme gave her a better understanding about herself because even though she was very interested in science during her education, after working and interacting with so many highly acclaimed scientists at the MBL, she decided that unlike them, her enthusiasm towards science was more on the application aspect rather than basic research. For this reason, after completing her PhD, Dr Qian made the decision to make a move to industry. However, she is very grateful to the JUSTL programme for providing her with the knowledge to help her make this decision. She is also grateful to the programme for giving her the opportunity to get to know the other JUSTL participants; they remain very good friends and still keep in touch with each other today.

Dr Ian Wing Yin MO

Dr Ian Wing Yin Mo recently took up the position of Lecturer in the School of Science & Technology at The Open University of Hong Kong (OUHK). Dr Mo obtained his PhD in 2014 from the Department of Biology at Hong Kong Baptist University (HKBU) working in the laboratory of Prof. Ming-hung Wong where he investigated the use of municipal food waste as fish feed. He combined food waste with Chinese herbs and prebiotic fibers to formulate fish pellets, and then determined the effect of a variety of different diets on the growth and immunity of several freshwater species including the grass carp (*Ctenopharyngodon idella*), bighead carp (*Hypophthalmichthys nobilis*), mud carp (*Cirrhinus molitorella*) and Nile tilapia (*Oreochromis niloticus*). After finishing his PhD, Dr Mo worked in Dr Anna Oi Wah Leung's laboratory at HKBU, and then he moved to The Education University of Hong Kong in 2015, where he was a Post-Doctoral Research Fellow again working with Prof. Ming-hung Wong, until his move to OUHK in September 2019.


Dr Ian Wing Yin MO is a Lecturer in the School of Science and Technology at The Open University of Hong Kong

Current work

Before his recent move to OUHK, Dr Mo worked at The Education University of Hong Kong, where he conducted similar research to what he began during his PhD. Rather than working with freshwater fish species, however, he was involved in developing fish feed from food waste for marine species including the Sabah giant grouper, (a hybrid species derived from crossbreeding between the tiger (*Epinephelus fuscoguttatus*) and giant grouper (*Epinephelus lanceolatus*)), the potato grouper (*Epinephelus tukula*), the pompano (*Trachinotus blochii*), and the star snapper (*Lutjanus stellatus*). He collaborated with a fish farm in the Sham Wan Marine Culture Zone near the Sai Kung Country Park, to optimize the size of the fish pellets to suit the larger fish species. Now that he is at OUHK, Dr Mo is proposing to continue with research as well as teaching courses on subjects such as Conservation and Biodiversity, and Green Management.

JUSTL Programme

Dr Mo was a participant in the 2012 JUSTL programme, and he worked mainly in the laboratory of Dr Richard McBride, Chief of the Population Biology Branch of the National Marine Fisheries Service (NMFS) at the Northeast Fisheries Science Center, National Oceanic and Atmospheric Administration (NOAA). In Hong Kong, as part of his PhD studies, Dr Mo had been trying to prepare histological sections of the gastrointestinal tract of the fish species he was working with, in order to address if the histology of the gut might be affected by diet. However, because of his lack of experience, he wasn't able to produce good data. He was fortunate that during his time in Woods Hole a mentor was selected who could help him achieve his goals. To this end, Dr McBride arranged for Dr Mo to visit two histology laboratories in the NOAA Centers on Rhode Island and at the University of Massachusetts in Dartmouth, where he saw the histology equipment used and borrowed some specimens. Dr McBride also taught Dr Mo about the histology of the American Shad (*Alosa sapidissima),* and he encouraged Dr Mo to catch his own fish for practicing his histological technique. As a consequence, Dr Mo baited a small fish trap with vegetables and squid, and dropped it off the NMFS pier. During his time at Woods Hole, he collected a variety of fish (such as oyster toadfish, spiny dogfish and summer flounder) and invertebrates (such as lobster, spider crab and star fish), some of which he used to prepare histological specimens.

As the histology equipment at NOAA was fully occupied, Dr Mo used the facilities in the laboratory of Dr Alan Kuzirian (Marine Resources Center, MBL). He was advised by Mr George Bell in Dr Kuzirian's laboratory, who is an expert in conducting histology and histochemistry on invertebrates. Dr Mo learned a lot about the various chemicals and procedures required for fixing and staining the different tissues and organs of the gut, and he was able to incorporate what he'd learned in Woods Hole back in Hong Kong and use this knowledge in his PhD thesis.

Dr Mo describes his stay in Woods Hole as being "wonderful." He told me that one highlight of his trip was when he caught a large number of different species in his trap all in the space of just one evening. Dr Mo is convinced that participating in the JUSTL programme helped to shape his career as it gave him a fantastic opportunity to interact with scientists from all over the world who all shared the same interest in fish histology.

Dr Johnson Kai Yu NG

Dr Ng is a Senior Technical Officer in the HKU School of Biomedical Sciences. He was awarded his PhD in 2011 working in Prof. Helen Wise's laboratory in the Department of Pharmacology, The Chinese University of Hong Kong. In his PhD project, Dr Ng investigated the dual-interaction between neurons and glial cells in rat dorsal root ganglion cells, demonstrating that glial cells regulate neurite outgrowth, whereas neurons regulate the activity of the enzyme adenylyl cyclase in glial cells. His findings provide a starting point for studies investigating the regeneration of neurites and the control of pain. After completing his PhD, Dr Ng worked first as Research Assistant, then as a Research Associate and finally as a Post-Doctoral Researcher in Dr Stephanie Kwai Yee Ma's laboratory (School of Biomedical Sciences, HKU), where he investigated the characteristics of cancer stem cells in the mechanism of tumorigenesis.

Current work

Dr Ng began his present job in July 2019. He is still working in Dr Ma's laboratory and he is still actively involved in research. However, following the retirement of the previous laboratory technician, Dr Ng is also now responsible for the daily management of the laboratory.

The JUSTL Program

Dr Ng attended the 2009 JUSTL Program. His mentor was JUSTL Co-Director, Prof. Robert Baker (Prof. Emeritus, New York University Medical School, NY, USA), and he worked on a project to investigate neuronal differentiation during the development of the hind-brain in zebrafish embryos. He showed that treatment with specific drugs affected the development of the anterior or posterior part of the hind-brain in a distinct manner.

Dr Ng recalls that the JUSTL Program, "was an exciting experience for me. At that time, I was just a junior postgraduate student with no idea about how scientists based in overseas institutions carry out scientific research. The JUSTL program gave me an invaluable opportunity to spend a summer in Woods Hole to do research in laboratory of a renowned overseas scholar."

He went on to say that "Under Prof Baker's supervision, I learned to design an experiment, and set up electroporation and single cell injections in zebrafish, as well as to interpret the data. In particular, I learned the advantages of using zebrafish in neuronal developmental studies." He also said, "During my stay in Woods Hole, the one person who inspired me most was Dr Omi Ma [Post-Doctoral Fellow in Prof. Baker's group]. He shared a lot of information about the working environment and his experience as a postdoc in the United States. In addition, he also kindly showed us some tips and tricks in taking good and publishable confocal images. All of these motivated and prepared me for continuing my research career as a postdoc."

"The JUSTL program gave me an invaluable opportunity to spend a summer in Woods Hole to do research in the laboratory of a renowned overseas scholar."

Summing up his time at the MBL, Dr Ng said, "During the intensive 8-week program, I learned a lot from the neurobiology lectures and evening seminars. Apart from these, what helped me most to

shape my career was the unique research environment in the MBL. We had interactions and exchanges with a diverse background of renowned scientists from neighbouring labs. We learned from them about how to solve different aspects of scientific questions with the cutting-edge facilities and technology available at the MBL. All of these helped a lot in my PhD study and subsequent post-doc training regarding how to better design experiments that fit my projects."

Dr Graham Ka Hon SHEA

Dr Graham Ka Hon Shea is a Croucher Foundation funded Clinical Assistant Professor in the Department of Orthopaedics and Traumatology, The University of Hong Kong. He was an MBBS/PhD student at HKU, completing his PhD training in 2010 and being conferred with his MBBS/PhD double degree in 2012. Dr Shea embarked on his PhD training on completion of the third year of his medical training. He conducted a project under the supervision of Prof. Daisy Kwok Yan Shum and Prof. Ying Shing Chan of the School of Biomedical Sciences at The University of Hong Kong. He investigated how Notch signaling modulates the Erb receptor in Schwann cells derived from bone marrow stromal cells, with a view to develop Schwann cell transplantation methodologies as a means to stimulate regeneration following nerve and spinal cord injuries. After completing his PhD, Dr Shea returned to medical school for two years, after which he completed a one-year medical internship followed by a six-year specialty training programme in Orthopedics and Traumatology. Dr Shea became a specialist in Orthopedics and Traumatology in 2019, and today, in addition to his clinical duties, he continues his basic science research in collaboration with Profs Shum and Chan.

Current work

During his six years of speciality training, Dr Shea spent most of his time on clinical duties. This included attending to patients in the clinic and ward as well as working in the operating theatre, and being on-call overnight. At this time, he also prepared for his membership and fellowship exams. In the limited time remaining, Dr Shea helped to co-supervise postgraduate students and in this way was able to continue his research in neurobiology but in a clinical context as peripheral nerve and spinal cord injuries are relevant to his field of practice. Now that his medical training is complete, Dr Shea has more time to spend on research and he is supervising three postgraduate students and one undergraduate student. Together, they are developing techniques to isolate glia from human bone marrow for cell therapy as well as studying the biology of glial scars, which form with damage to the nervous system. In addition, Dr Shea has a number of ongoing clinical research projects concerning the use of novel drugs to treat back pain, and on the pathomechanism of scoliosis.

JUSTL Programme

Dr Shea was a participant in the 2009 JUSTL programme, and his mentor was Prof. James L. Salzer, who is an expert in glial biology at New York University School of Medicine. Dr Shea worked on a project to investigate the role of mTOR in regulating the maturation of Schwann cell precursors. He found his time in the Salzer laboratory to be very inspiring as he learned to appreciate how Prof. Salzer managed his team. He also recalls that, "It was interesting working with an international group of post-docs and PhD candidates and hearing their stories of how they had gotten to this stage of their research careers."

In addition to his laboratory-based work, Dr Shea attended a number of lectures and seminars at the MBL and found them highly enlightening as they "provided a glimpse of the remarkable advances in different fields."

Dr Shea found the JUSTL programme to be especially good in helping him to network and connect with specialists in his area of research. Indeed, after the 2009 JUSTL programme had finished, Dr Shea and Prof. Salzer kept in contact and Dr Shea's PhD supervisors began a formal collaboration with Prof. Salzer and they secured a Research Grants Council grant together.

When I asked Dr Shea if the JUSTL programme might have helped to shape his career, he told me, "I saw the dedication, resources, and years of investment without immediate return that is required to be successful in basic science research. Though this remains a main research passion of mine, I have subsequently dedicated more time to translational and clinical research. As I try to juggle my priorities as a clinician scientist, it is easier to think about how to apply breakthroughs in basic biology to more clinically applicable scenarios."

Dr Summer Min SHEN

Dr Summer Min Shen obtained her PhD in Environmental Science from City University of Hong Kong in 2011. After finishing her PhD studies, she moved to Shanghai where she became a Lead Toxicologist with The Dow Chemical Company. Today, Dr Shen is still working at Dow where she is the Asia-Pacific Sustainability Leader.

JUSTL Programme

Dr Shen attended the JUSTL programme in 2008. Her mentor was Dr Roxanna Smolowitz, a year-round scientist at the MBL at that time (now at the Feinstein School of Social and Natural Sciences, Roger Williams University, Bristol, RI, US), and together they investigated the effect of temperature on components of the blood in toadfish. She used flow cytometry and microscopy to identify the various blood cell types and the amount of phagocytosis as well as the level of programmed cell death (apoptosis) in the cells at different temperatures.

Dr Shen remembers her time at the MBL. "It was [over] 10 years ago that I joined the JUSTL programme, when I just started to read my PhD. It was the first time that I joined an international programme and also the first time for me to visit the USA. The programme was an eye-opening experience for me. Thanks Prof. Miller, the Croucher Foundation and the Hong Kong Government for providing post-graduate students in Hong Kong with this great learning opportunity."

Dr Jack Wai Ho TANG

Dr Jack Wai Ho Tang is a Principal Investigator in the Institute of Paediatrics at the Guangzhou Women and Children's Medical Center, Guangzhou Medical University (Guangzhou, China). He graduated with a PhD from the laboratory of Prof. Stephen SM Chung in the Department of Physiology at the University of Hong Kong, where he studied diabetic complications of cardiovascular disease, especially how the polyol (glucose toxicity) pathway contributes to diabetic complications. After graduating with his PhD in 2010, Dr Tang then spent four years in post-doctoral training at the Cardiovascular Research Centre at the Yale University School of Medicine (New Haven, CT, USA), where he discovered that diabetic patients are more likely to suffer from stroke and heart attack due to high levels of glucose in the platelets, which result in their hyper-activity or even apoptosis (programmed cell death).

Current Work

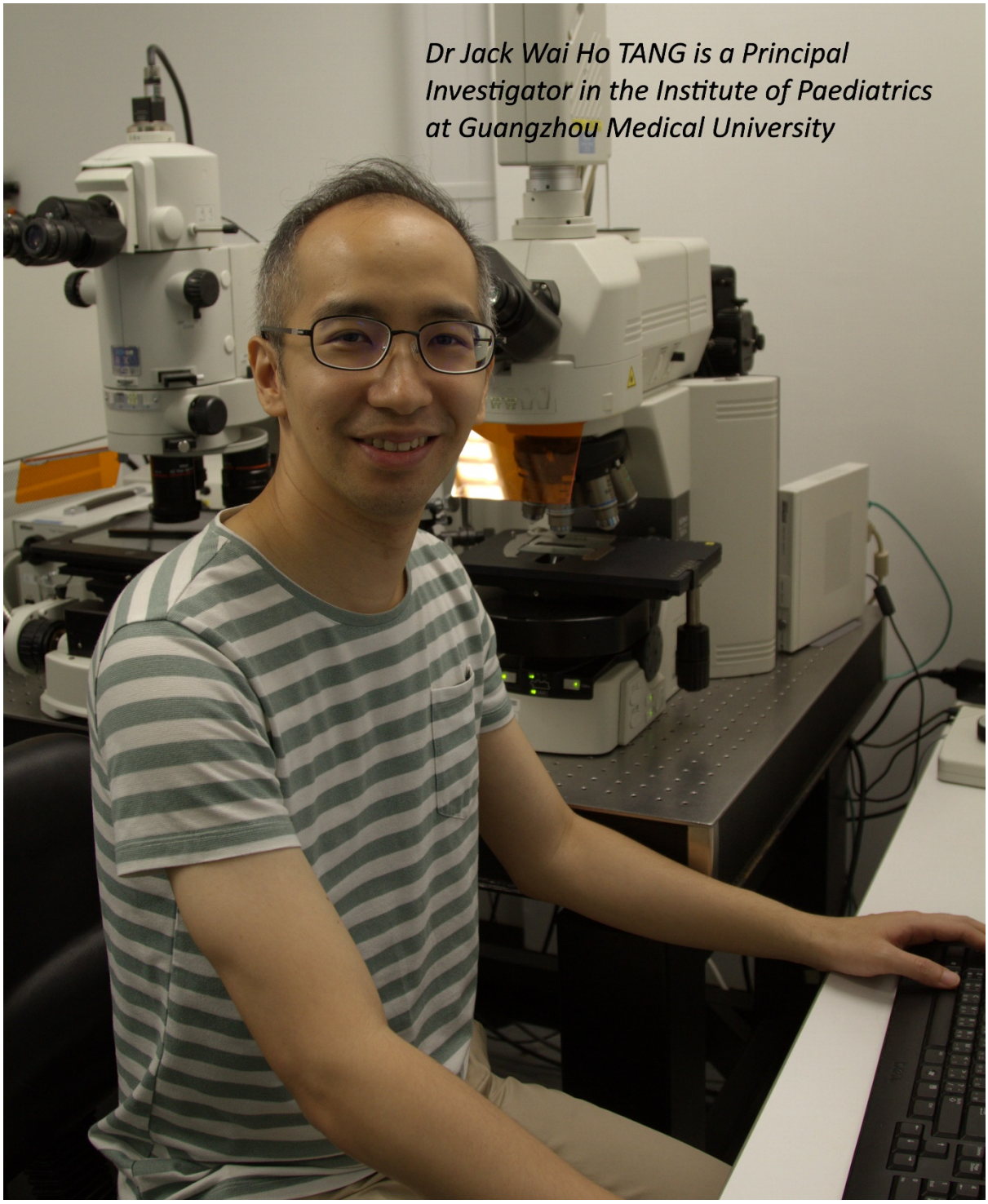
Dr Tang established his own laboratory in Guangzhou in 2015. He is still working with platelets but rather than focussing on hyper-activity and apoptosis, he is investigating how platelets transfer their cellular contents (including proteins, micro-RNA and mitochondria) to other vascular cells, and in this way regulate the function of other cell types. Dr Tang continues to have an active collaboration with his PhD mentor (Prof. Stephen Chung), who is now the Dean of Science and Technology at the United International College, Zhuhai (China), and his post-doctoral mentor, Prof. John Hwa, in the Cardiovascular Research Centre at Yale University.

JUSTL Programme

Dr Tang joined the JUSTL programme in 2008. He divided his time between his own project mentored by the JUSTL Director and Co-director, Profs Andrew L. Miller and Robert Baker, and a project conducted by Prof. Paul Malchow (University of Illinois at Chicago). In the first project, Dr Tang investigated the effect of hyperglycemia on heart development in zebrafish embryos, whereas in the second project, he used various pH-sensitive fluorescent dyes to measure changes in pH on the retinal cell membrane.

"…the environment was very favourable for scientific exchange with regards to both knowledge and techniques."

In addition to experiments, Dr Tang also attended several lectures and seminars where he learned about new cutting-edge techniques and the latest research findings of scientists from top-class universities around the world. Dr Tang recalls that the most impressive thing about the MBL was that the environment was very favourable for scientific exchange with regards to both knowledge and techniques. This showed him how people make connections and establish collaborations and made him understand the importance of communication for the development of a successful research and academic environment. Dr Tang firmly believes that attending the JUSTL programme helped his career. He had attended conferences in the US before but this was the first time he had experienced how scientists in the US run their laboratories. This gave him to confidence to apply for post-doctoral training outside Hong Kong after he had completed his PhD training.


Dr Jack Wai Ho TANG is a Principal Investigator in the Institute of Paediatrics at Guangzhou Medical University

Dr Kitman TSANG

Dr Kitman Tsang is a Staff Scientist in Dr Beth Kozel's laboratory at the National Heart, Lung and Blood Institute (NHLBI) at the National Institutes of Health (NIH) in Bethesda, MD, USA. She was awarded her PhD (Biochemistry) as part of a Graduate-partnership programme (GPP) between The Chinese University of Hong Kong and the NIH. Thus, much of her research was conducted at the NIH under the supervision of Dr Constantine Stratakis (Scientific Director of NICHD), but her PhD was awarded by The Chinese University of Hong Kong. Her mentor at The Chinese University of Hong Kong was Dr Kwok-Pui Fung (now in the School of Biomedical Sciences). Her PhD project involved elucidating the disease-causing mechanism of Carney complex. This is a rare genetic disorder, which is characterized by numerous benign tumors that commonly affect the heart, endocrine system and skin of patients. When she was doing her PhD, Dr Tsang was presented with the NIH Fellow award for Research Excellence on two occasions. After completing her PhD studies, she had her postdoctoral training in the laboratory of Dr Linzhao Cheng at Johns Hopkins School of Medicine (with the support of Croucher Foundation and Maryland Stem Cell Research Fund postdoctoral fellowship grants), and then in the laboratory of Dr Asrar B. Malik at the University of Illinois at Chicago supported by the Chicago Biomedical Consortium Postdoctoral Research Grant programme and an American Heart Association Postdoctoral grant.

Current Work

Dr Tsang has worked in Dr Beth Kozel's laboratory since mid-2016. She is mainly involved in a project where human induced pluripotent stem cells (iPSCs) are used to model diseases such as William Syndrome and Supravalvular Aortic Stenosis, and is in the process of developing a patient (iPSC)-based platform for drug screening and mechanistic studies. She is also interested in using cells differentiated from iPSCs to generate transplantable blood vessels *in vitro*.

JUSTL Programme

Dr Tsang was a participant in the 2010 JUSTL programme. Her mentor was Prof. Joseph D Buxbaum (Icahn School of Medicine at Mount Sinai, New York, NY, USA), and for her project she studied the role of the endosomes in the degradation of the *shank3* gene in synapses, using zebrafish as an animal model. She was interested in the *shank3* gene because in humans, mutations in this gene result in neurodevelopmental disorders such as autism spectrum disorder. Dr Tsang found that when the gene was knocked down in zebrafish, the embryos developed with smaller eyes and head, there were abnormalities in the morphology of the brain, and the motility was also affected.

In addition to her laboratory-based work, Dr Tsang attended lectures each morning. "I remember that I attended some lectures related to embryology and interacted with scientists working on regeneration and vessel development. This exposure definitely shaped the beginning of my career in the stem cell biology field. I was amazed by the regenerative potential of some animals. I have always wanted to contribute to society by relieving the burden of diseases in humans. For this reason, I thought it would be great if I could contribute my time and effort to finding possible uses of stem cells in regenerative medicine. That's how I moved into this exciting field."

"..I attended some lectures related to embryology and interacted with scientists working on regeneration and vessel development. This exposure definitely shaped the beginning of my career in the stem cell biology field."

Summing up her time at on the JUSTL programme, Dr Tsang said, “The summer of 2010 in the MBL, Woods Hole was unforgettable. I had a wonderful and fruitful summer.”

Dr Ling Ming TSANG

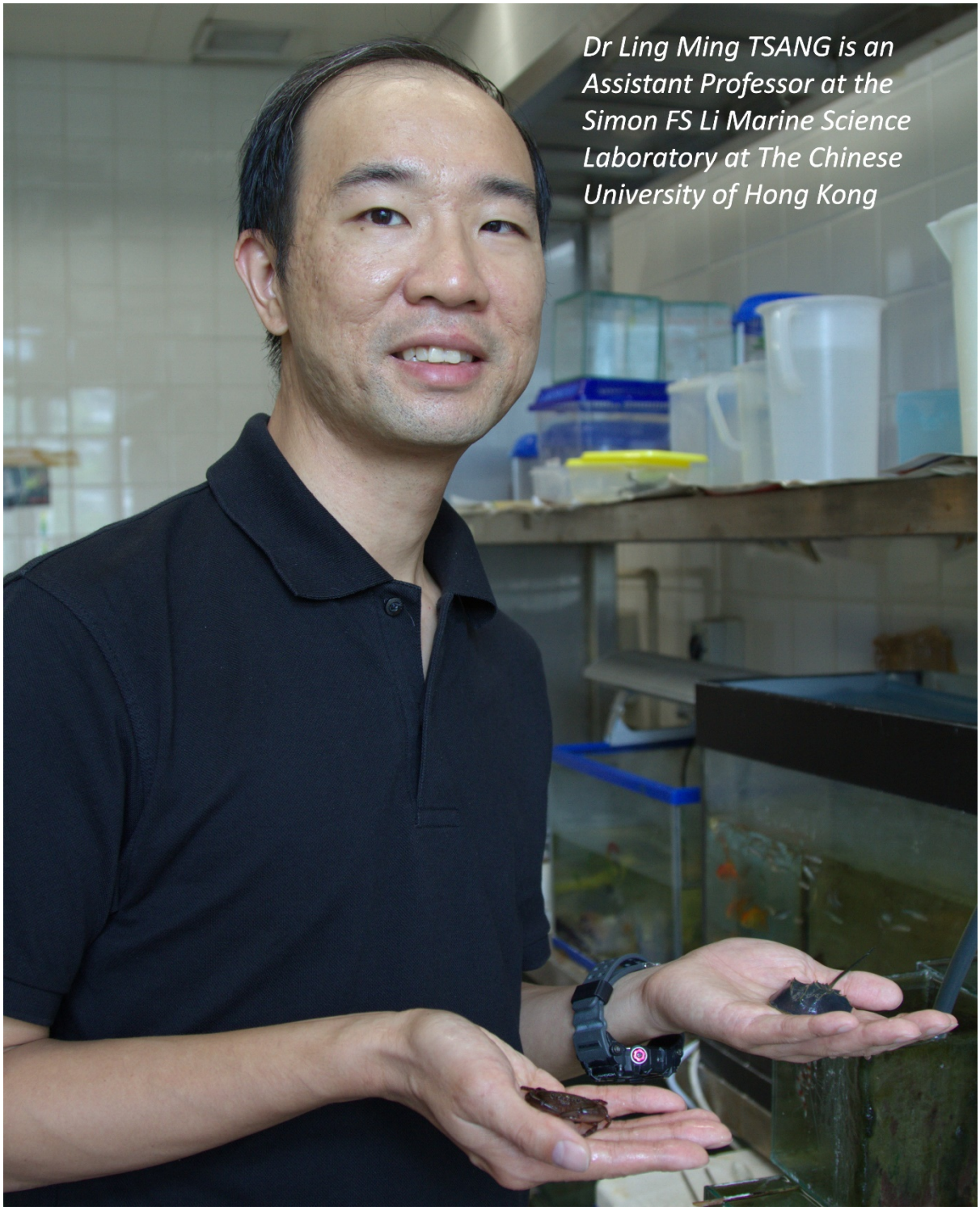
Dr Ling Ming Tsang is an Assistant Professor in the Simon FS Li Marine Science Laboratory in the School of Life Sciences at The Chinese University of Hong Kong. He graduated with a PhD in 2010 from the laboratory of Prof. Ka Hou Chu at The Chinese University of Hong Kong where he studied the evolution and phylogeny of various crustaceans such as crabs, hermit crabs and shrimps. After his PhD, Dr Tsang stayed on in Prof. Chu’s laboratory as a post-doctoral research for 3 years, after which he went to Taiwan to work as an Assistant Professor and then as an Associate Professor for almost 5 years.

Current Work

Dr Tsang established his own laboratory in the The Chinese University of Hong Kong Simon FS Li Marine Science Laboratory in February 2018. He now has a number of projects. He uses molecular techniques such as next-generation sequencing (NGS) along with big data and RNA sequencing to investigate the evolution and ecology of crustaceans living in Hong Kong waters. One of his projects involves investigating how mangrove crabs digest leaves, if they contain the correct genes themselves or if they possess bacteria in their gut, which help to break down the plant material. To this end, his team are studying the genome of the bacteria and the crab in order to determine the relative contribution of the two. They also investigate how these different species evolve along different lineages. In addition, Dr Tsang conducts several projects related to conservation; he uses sequencing techniques to identify new species in Hong Kong, and simple population genetics to investigate the genetic diversity of different populations such as freshwater shrimp living in streams in and around the New Territories. Most recently, Dr Tsang and his colleagues have started to prepare a series of guidebooks for the marine organisms in Hong Kong. He goes out into the field, takes photographs of different species of crabs and then writes a brief description about how they can be identified.

JUSTL Programme

Dr Tsang was a first year PhD student when he joined the JUSTL programme in 2008. Another student from the Marine Science Laboratory (Alice Lie) had been involved in the programme during the previous summer and she highly recommended it to Dr Tsang. In addition, Dr Tsang’s PhD supervisor, who is an alumnus of the Woods Hole Oceanographic Institute (WHOI), suggested that Dr Tsang apply for the JUSTL programme to get some outside research and life experience. Not having travelled for such a long


Dr Ling Ming TSANG is an Assistant Professor at the Simon FS Li Marine Science Laboratory at The Chinese University of Hong Kong

period before, Dr Tsang was hesitant at first, but when he was on the JUSTL programme, he thoroughly enjoyed himself.

Dr Tsang's JUSTL mentor was Dr Timothy Shank who is a year-round scientist at the WHOI, which (like the MBL) is part of the Woods Hole Consortium. Dr Shank is interested in the molecular ecology and evolution of species living in the deepest part of the ocean, called the benthic layer. When he worked in the Shank laboratory, Dr Tsang analysed some of samples collected by the WHOI remotely operated underwater vehicle (ROV) from various deep-ocean sites. He also investigated the population genetics of the stalked barnacle (*Glyptelasma* sp.) from these sites using molecular techniques. Today, many researchers routinely apply these methods but over a decade ago, when Dr Tsang was working in Dr Shank's laboratory, this technology was new and cutting-edge.

In addition to the research, Dr Tsang recalls the social and cultural aspects of the JUSTL programme: meeting and interacting with people from different places, and playing cards late at night in the dorm. He pointed out that even though the JUSTL programme had some limitations with regards to the duration of stay (only being for 8 weeks), it was so successful because it gave students inspiration and hope with regards to their future career. He thinks that this is a major benefit of the JUSTL programme.

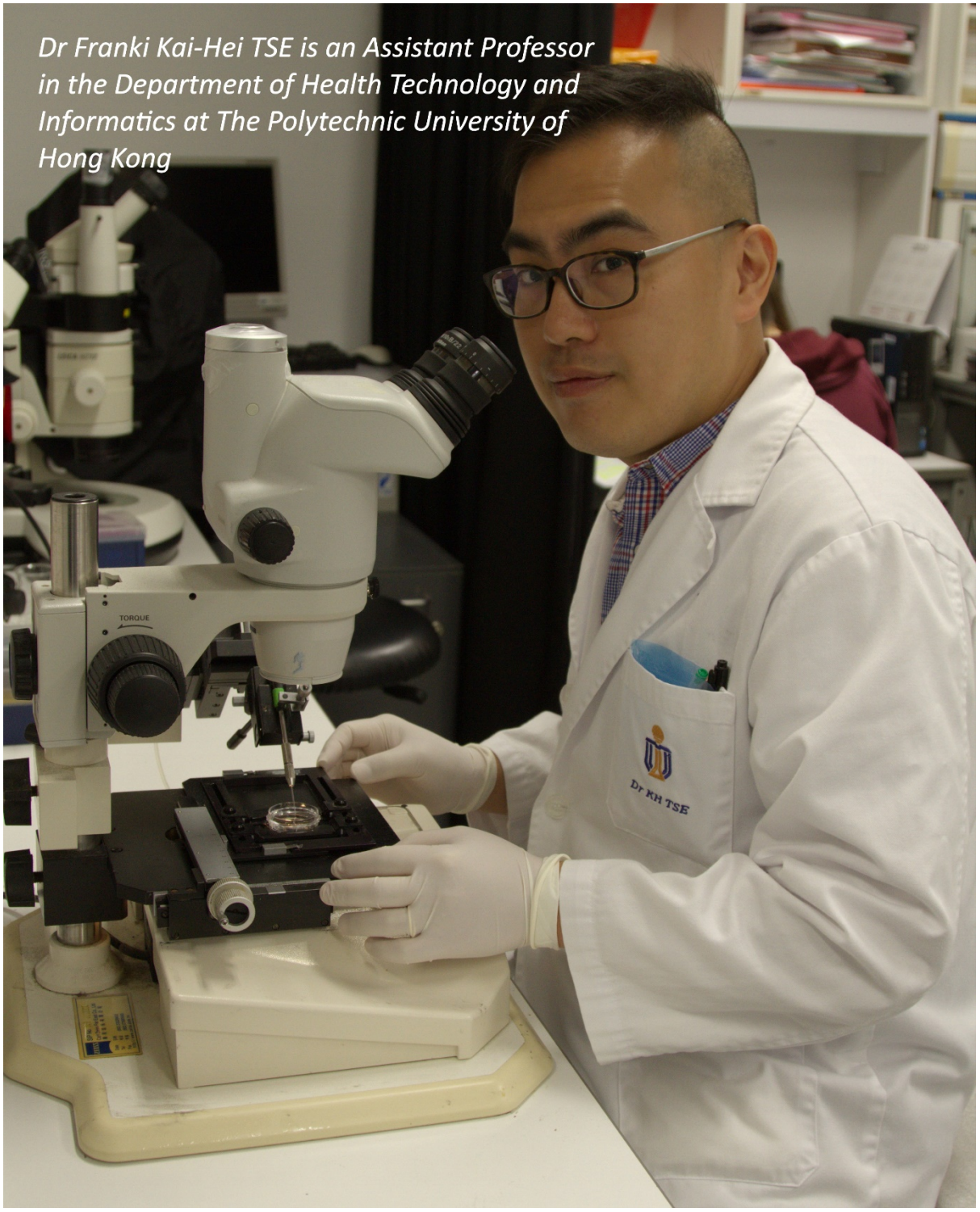
Now that Dr Tsang is responsible for his own students, he is involved in helping to arrange overseas exchange for them. He now understands the importance of matching the students with right mentor depending on their interests. He said that Woods Hole is a unique place, and when other exchange programmes are arranged it is very difficult to exactly mimic the JUSTL programme at the MBL where everything, including the arrangement of accommodation and meal times allow researchers to interact.

Even though Dr Tsang spent his time in Dr Shank's laboratory at WHOI, he still attended lectures and workshops at the MBL. Indeed, he attended all of the lectures and also joined in with the afternoon laboratory sessions for the *Workshop on Molecular Evolutio*n. Dr Tsang said that he learned a lot from the scientists running this course who were all leading experts in their field.

In addition to these various academic activities, Dr Tsang has many great memories from the JUSTL programme. He especially remembers the going to a barbecue, and also watching fire-flies as they walked back to the dorm one night. He said that if in the future another similar programme is organised then he would definitely encourage his students to attend.

Dr Franki Kai-Hei TSE

Dr Franki Kai-Hei Tse has just started a new job as an Assistant Professor at The Polytechnic University of Hong Kong. He graduated with a PhD from Prof. Helen Wise's laboratory at The Chinese University of Hong Kong where he was investigating the role of Toll-like receptor 4 in regulating neural information in sensory neurons during their interaction with glial cells. He was interested in finding out if this receptor signalling pathway might play a role in regulating inflammatory pain. He discovered the functional expression of Toll-like receptor 4 in neurons, which was very unexpected because neurons are supposed to be immune-privileged. However, he showed that neurons expressing Toll-like receptor 4 recognise danger signals such as invasion by bacteria (identified via lipopolysaccharides on the outer membrane) and induce inflammation. This was a new and exciting finding because while it has been known for many years that inflammation in the nervous system requires infiltration of microglia and macrophages, this was the first demonstration of neurons regulating inflammation by themselves. After finishing his PhD in 2014, Dr Tse moved to The Hong Kong University of Science and Technology where he was a Post-Doctoral Researcher and subsequently a Research Assistant Professor in the laboratory of Prof. Karl Herrup. There he explored the cellular mechanisms involved in the myelin degeneration known to occur in age-related Alzheimer's disease.



Dr Franki Kai-Hei TSE is an Assistant Professor in the Department of Health Technology and Informatics at The Polytechnic University of Hong Kong

Current Work

Dr Tse has recently started a new job as a tenure-track Assistant Professor in the Department of Health Technology and Informatics. He is currently setting up his laboratory there where he will continue his research on oligodendrocytes and myelin degradation in the aging brain and during age-related Alzheimer's disease, and he is especially looking forward to training the next generation of scientists.

JUSTL Programme

Dr Tse was a PhD student at The Chinese University of Hong Kong when he joined the JUSTL programme in 2013. He was involved in two different projects at the MBL. For the first few weeks, under the guidance of Profs Andrew L. Miller (The Hong Kong University of Science and Technology) and Robert Baker (New York University Medical School), the JUSTL Director and co-Director, respectively, Dr Tse established protocols to evaluate the use of zebrafish larvae for screening pharmacological compounds using changes in their locomotory behaviour as a read-out. The second half of Dr Tse's summer at the MBL was spent in the laboratory of Prof. Scott T. Brady (University of Illinois at Chicago, IL, USA). There, he learned how to make use of the giant unmyelinated axon of the squid (*Doryteuthis pealei*) for studying axonal transport. In his end-of-programme report, Dr Tse said that "the new techniques and new knowledge [gained] from the JUSTL programme are all translational to my PhD programme in Hong Kong." He went on to say that he wished that he might have an opportunity to return to the MBL again perhaps as a Summer course participant or as a Young Investigator.

"..every [JUSTL] student could conduct their own project as a more-or-less independent investigator, should they so wish."

When I spoke with Dr Tse recently, he told me that attending the JUSTL programme was a fantastic experience for him. He said that he is really very grateful for his advisor, Prof. Wise, allowing him to go to the MBL for two months when he was in the middle of his PhD training, and appreciated that many supervisors would not be as supportive for their students to take so much time away from their home laboratory. Dr Tse found the JUSTL programme to be especially appealing because every student could conduct their own project as a more-or-less independent investigator, should they so wish. He said that this provided students with invaluable experience at formulating their own hypothesis and testing it experimentally in an environment with the scientific support in-built with regard to people providing advice, state-of-the-art equipment and readily accessible resources. So he really appreciated the opportunity to work with zebrafish larvae under the guidance of Profs Miller and Baker, and indeed some of this work was included in Dr Tse's PhD thesis. In addition, Dr Tse said that working in Prof. Brady's laboratory with the squid as a model of axonal transport, taught him that "once you have identified a suitable model to test your biological mechanism, then you have a secret weapon for your research." Dr Tse still keeps in contact with Prof. Brady who has visited Hong Kong on a number of occasions, and they often meet up at Society of Neuroscience meetings. Dr Tse has also kept in touch with the people who he met in Prof. Brady's laboratory at the MBL. These include Dr Yuyu Song, M.D., PhD, a graduate student and then post-doctoral researcher in Prof. Brady's laboratory, who is now a Research Fellow in Therapeutic Science at Harvard University. Like Dr Tse, she is working on neurodegenerative diseases such as Alzheimer's disease.

Dr Tse said that the JUSTL programme gave him his first taste of being an independent investigator as well as providing him with the opportunity to build up a network of international advisors and potential collaborators. He is also very grateful to Profs Miller and Baker for introducing him to the directors of the *Neural Systems & Behaviour* course, so that he could go into the laboratory when the course students were running experiments, and chat with people. All in all, Dr Tse found his eight weeks on the JUSTL programme to be an excellent experience all round. In light of the fact that the

Hong Kong Government Education Bureau is promoting and facilitating STEM (science, technology, engineering and mathematics) education among teachers and students in the city, Dr Tse would like to see more programmes like JUSTL being organised to give the next generation of researchers the opportunity to work overseas. He says that being successful in science is all about international collaboration rather than staying in your home territory and that institutions such as the MBL, which attract scientists from all over the world for two or three months every summer, are excellent places for postgraduate students and junior faculty to meet people and gain confidence in their field.

Dr Tim Yue Him WONG

Dr Tim Yue Him Wong is an Assistant Professor in Shenzhen University, Institute for Advanced Study (IAS). He obtained his PhD in 2012 in the laboratory of Prof. Pei-Yan Qian (Department of Ocean Science, The Hong Kong University of Science and Technology), where he investigated the molecular mechanisms involved in the larval metamorphosis of *Bugula neritina*, a marine bryozoan, which causes serious biofouling problems but at the same time is of great interest in the drug discovery field, due to the production of the anti-cancer compound, bryostatin. After finishing his PhD, Dr Wong stayed on at The Hong Kong University of Science and Technology for 3 years as a Post-Doctoral Fellow working in Prof. Qian's laboratory, after which he worked in Akita Prefectural University (Japan) for 3 years as a Specially Appointed Assistant Professor, and then he spent a few months in the Biodiversity Research Center, Academia Sinica, Taipei, Taiwan as a Visiting Assistant Professor.

Current Work

Dr Wong began work in the IAS at Shenzhen University in November 2018, so he is currently in the process of setting up his laboratory, recruiting and training students, and writing grant proposals. He is still involved in biofouling research, developing methods to prevent marine invertebrates from settling on man-made surfaces, which is a major problem in the maritime and fish farming industries world-wide. He still does some work with *Bugula neritina* (a so-called 'soft' fouler) but works mainly with barnacles ('hard' foulers). In addition to these species making ships and other ocean vessels more complex and heavy, and thus less energy efficient, they also take up a significant amount of space in fisheries such as scallop farms. Dr Wong investigates the biology of these species, especially from a molecular evolutionary perspective. For example, he is interested in determining the molecular evolution of the barnacle shell and cement in order to explain why they can attach to many different types of substratum, including whale skin and coral as well the metal hulls of ships and concrete piers.

JUSTL Programme

Dr Wong joined the JUSTL programme in 2010. His mentor was Dr Alan Kuzirian (Marine Resources Center, MBL), whose research involved using bryostatin from *Bugula neritina* to investigate long-term memory in the sea slug *Hermissenda*. Dr Wong was therefore able to continue his PhD research on investigating the metamorphosis of *Bugula neritina* in Dr Kuzirian's laboratory. Dr Wong has lost touch with Dr Kuzirian but remains in contact with the research assistant in that laboratory, Mr George Bell, who taught him histological sectioning techniques. Indeed, this was the first time that Dr Wong had attempted any histology, but he found it so useful that it has become a routine technique in his laboratory today.

> *"Alan [Kuzirian] is the first person I met who told me to do [research] that is unexpected……go for something that no one has explored before."*


Dr Tim Yue Him WONG is an Assistant Professor at Shenzhen University Institute for Advanced Study

In addition to his laboratory work, Dr Wong also attended the MBL *Embryology* course lectures. He recalls that there he received a very intensive introduction to the development of the major animal model species, such as sea urchins and *Drosophila*. He said that, "Some of the most fundamental Evo-Devo [evolutionary developmental biology] questions were discussed in the lectures, and speakers, who were all at the top of a particular research field, and gave [ ] a comprehensive review on their topic." Indeed, Dr Wong told me that the work he is now involved in on barnacle evolution, was initiated when he visited the MBL during the JUSTL programme.

Dr Wong recalls that what inspired him the most about his time at the JUSTL programme was the idea to pursue research that is interesting and 'cool', rather than conducting routine (and boring) experiments where the results are easily published. He said that, "Alan [Kuzirian] is the first person I met who told me to do [research] that is unexpected……go for something that no one has explored before." Indeed, in his own laboratory today, Dr Wong encourages his students to follow this same working philosophy that so motivated him nearly a decade ago at the MBL.

Dr Nan (Tori) XIAO

Dr Nan Tori Xiao is an Assistant Professor in the Department of Biomedical Sciences at the Arthur A. Dugoni School of Dentistry at the University of the Pacific (San Francisco, US). After completing her DDS (Doctor of Dental Surgery) and M. Ortho (Membership in Orthodontics) training at the School of Stromatology, Peking University (Beijing, China), she came to Hong Kong for her PhD studies in the laboratory of Prof. Jun Xia (Division of Life Science, The Hong Kong University of Science and Technology). There, she investigated the role of protein interacting with C kinase 1 (PICK1) in the protein trafficking involved in the formation of the acrosome, as it is known that deficiencies in PICK1 lead to an infertility disorder in males called globozoospermia. After Dr Xiao finished her PhD in 2009, she moved to the US where she received postdoctoral training first in the Department of Oral Biology in the School of Dentistry at University of California Los Angeles and then in the Department of Radiation Oncology at Stanford University.

Current Work

Dr Xiao has worked at the Dugoni School of Dentistry since 2014. In addition to her teaching responsibilities, she also conducts her own research. She is currently investigating stem cell-mediated regeneration and uses dental pulp stem cells, which are readily available and easily accessible during routine root canal surgery. Dr Xiao is interested in understanding the molecular pathways involved in stem cell regeneration and how her findings might be useful in a clinical application.

JUSTL Programme

Dr Xiao was a participant in the 2007 JUSTL programme. She was mentored for the first four weeks of her stay by Prof. Enrico Nasi (now at the National University of Colombia), and for the last four weeks by Prof. Scott T. Brady (University of Illinois at Chicago, Chicago, IL, USA). Dr Xiao was involved in two projects with Prof. Nasi who investigates the light transduction pathway in the scallop retina. She used the SMART-RACE cDNA amplification technique in an attempt to amplify one of the photo pigments found in the ciliary cells of the scallop, and she was involved in obtaining the full length sequence of another photo pigment, called rhodopsin. Prof. Brady is interested in the fast axonal transport that is known to occur in a number of neurodegenerative diseases and he utilizes the squid giant axon

"I was impressed by the diversity of research done here, the tremendous cooperation of different labs and the amazing ideas of the researchers."

as a model system. When Dr Xiao worked in Prof. Brady's laboratory, she learned about various aspects of his work and the methodologies used to address his research questions.

In her end-of-programme report, Dr Xiao was impressed that, "Researchers from around the world come to the MBL during the summer and set up their lab here within a short period of time." She went on to say that, "I was impressed by the diversity of research done here, the tremendous cooperation of different labs and the amazing ideas of the researchers." She said that as a graduate student it was an eye opening experience and that, "Woods Hole is a paradise for researchers," because people worked and relaxed when it suited them; they might work through the night and during the weekend and then go fishing every morning.

This was the first time that Dr Xiao had visited the US and she says that her 8-week stay at the MBL had an impact on the decisions she made about her career. Consequently, after completing her PhD in Hong Kong, instead of continuing her dental training, she made the decision to stay in academia so that she could spend her life doing research.

Dr Junyu XU

Dr Junyu Xu is an Associate Professor at the Center of Neuroscience, Key Laboratory of Medical Neurobiology of Ministry of Health at Zhejiang University in Hangzhou (China). She completed her PhD in 2009 in the laboratory of Prof. Jun Xia (Division of Life Science, The Hong Kong University of Science and Technology). There, she investigated the roles of the extracellular matrix protein, thrombospondin 1 (TSP1), and the adaptor protein, protein interacting with C kinase 1 (PICK1), in neuroligin-mediated synaptogenesis, a process that is essential in the central nervous system for establishing the neural networks required for memory, learning, social communication and many other complex brain functions. After finishing her PhD, Dr Xu worked in the Division of Life Science (The Hong Kong University of Science and Technology) and Shenzhen-PKU-HKUST Medical Center (Shenzhen, China) for 2 years, after which she moved to Zhejiang University.

Current Work

Dr Xu has worked at Zhejiang University since 2011. There, she continues her work on neuroligin, and she has now extended her research field to investigate its role in synapse formation and in neural circuitry formation and behaviour. Her overall goal is to determine how mutations in neuroligin and other synaptic-function-related genes, and dysfunction of the brain circuitry lead to autism.

JUSTL Programme

Dr Xu was a participant in the 2007 JUSTL programme. Her mentor was Prof. George Augustine (currently at the Lee Kong Chian School of Medicine, Nanyang Technological University, Singapore), and in his summer laboratory at the MBL she learned a lot about his research on the release of neurotransmitters using the squid giant axon as a model. She is very appreciative of the opportunity Prof. Augustine gave her to learn the basic techniques required to conduct electrophysiology on the squid axon. Specifically, she learned how to dissect the squid to obtain the giant axons, micro-inject dyes into the pre-synaptic terminal and set up an electrophysiology rig for sharp electrode recording. Dr Xu still uses electrophysiology today for part of her research. While she has lost touch with Prof. Augustine, she still keeps in contact with his former laboratory members, including Dr Yulong Li, who is now a Principal Investigator at Peking University.

In addition to her work in the laboratory, Dr Xu also attended many of the *Neurobiology* course lectures and in her end-of-programme report she said that she learned a great deal from the course, from the most basic and fundamental information to the most advanced techniques and equipment currently used in neurobiology. Dr Xu especially remembers one lecture, given by Prof. Guoping Feng

(currently at McGovern Institute for Brain Research, Massachusetts Institute of Technology), who studies the relationship between the brain circuitry and behaviour in a mouse model for psychiatric disease. Dr Xu recalls that she and Prof. Feng had many in-depth talks and exchanged many ideas in neurobiology research and psychiatric disease. Since then, they have kept in close contact with each other and they now have a formal collaboration between their two laboratories.

Dr Xu describes her time on the JUSTL programme as being a "wonderful experience," and she attributes her interest in brain circuitry and behaviour, and the use of mouse models to study autism, at least in part to her lengthy discussions with Prof. Feng at the MBL.

Dr Kosmo Ting Hin YAN

Dr Kosmo Ting Hing Yan is a Biotechnology Leader and Laboratory Manager in a start-up company in Hong Kong called Geb Impact Co. He obtained his PhD in 2015 in the laboratory of Prof. Joseph Tin Yum Wong (Division of Life Science, The Hong Kong University of Science and Technology), where he investigated the role of the condensin protein complex in regulating the condensation and structure of the chromosomes in various dinoflagellate species, including: *Crypthecodinium cohnii*, *Karenia brevis*, *Amphidinium carterae* and *Alexandrium tamarense*. After completing his PhD, Dr Yan continued to work in Prof. Wong's laboratory at The Hong Kong University of Science and Technology as a Post-Doctoral Fellow, where he continued to study the nuclear proteins (condensin, histones and histone chaperone proteins) in dinoflagellates as well as developing a method to transiently knockdown genes in these unicellular microorganisms.

Current Work

Dr Yan has worked at Geb Impact Co. since late 2017. His work involves developing and optimizing techniques for cultivating microalgae, and promoting the use of microalgae for commercial applications with regards to developing their use in green industry. Dr Yan's main responsibilities involve conducting research and development of different microalgae cultivations, and developing their use in various different applications such as in the food, nutrient supplement, cosmetic and biofuel industries. He also mentors the junior engineers and is involved in writing proposals for the application of research funds.

JUSTL Programme

Dr Yan participated in the 2011 JUSTL programme and his mentor was Dr Irina Arkhipova, a year-round Associate Scientist at the MBL, who is based in the Josephine Bay Paul Center for Comparative Molecular Biology and Evolution. Dr Yan worked with the planktonic rotifer species, *Brachionas manjavacas* and *Brachionus calyciflorus* on a project to analyse their transposable elements, which are regions of DNA that can move within or between genomes. He was involved in cloning and identifying the *Athena* retroelements that are concentrated at telomeric regions in these rotifer species, so that their organization could be compared in related species.

"…researchers regularly organized open seminars to deliver their scientific knowledge, in an easily understandable presentation, to the general public."

In addition to his research work, Dr Yan attended lectures for the *Microbial Diversity* summer course and the Workshop on Molecular Evolution. He found that these both gave him a fantastic opportunity to explore these specific fields of biology as such focussed courses don't tend to be available for students in Hong Kong. Dr Yan also said, "It was the first time I witnessed how western-

View of WHOI and MBL buildings from across Eel Pond

style lectures are conducted. They are all about respecting others to have different opinions, free to think, independent to argue. Egalitarianism but no authoritarianism. I can see that ideas were freely exchanged between the lecturers and their audience. Also, this institution [the MBL] took their social responsibility seriously as researchers regularly organized open seminars to deliver their scientific knowledge, in an easily understandable presentation, to the general public. I really appreciate this kind of charitable activity as it made me realize that scientists are not meant to be always isolated in 'an ivory tower', but can also share what they have discovered with people from non-academic fields."

Dr Yan recalls that, "During my early PhD studies at HKUST, I read some interesting and significant papers from authors whose name I remembered but I had no clue who they were or where they were from. The JUSTL programme gave me the opportunity to attend lectures by these scientists; for example, Dr Mitchell Sogin (MBL) who works in the field of evolution biology, and Dr Donald M Anderson (WHOI) who works on dinoflagellates. These senior researchers really inspired me and I set them as my role model when pursuing my own career and making my own contributions to scientific research."

Dr Raymond YIP

Dr Raymond Yip is a Post-Doctoral Fellow in a laboratory jointly headed by Prof. Geoff Lindeman and Prof. Jane Visvader at the Walter and Eliza Hall Institute (WEHI) of Medical Research in Melbourne, Australia. He obtained his PhD in 2016 in Prof. Kathryn S.E. Cheah's laboratory in the School of Biomedical Sciences, The University of Hong Kong, where he was involved in identifying and characterising novel human *SOX9* enhancers, and investigating the function of Sox9 in regulating the differentiation of hypertrophic chondrocytes to osteoblasts during the process of endochondral ossification. After finishing his PhD, Dr Yip continued to work in Prof. Cheah's laboratory for an additional 6 months before taking up the position at WEHI.

Current Work

Dr Yip is currently investigating why breast cancer cells preferentially metastasize to the skeleton rather than to other organs. He uses high-resolution imaging methods to track cancer cells in real time to determine where and how they hijack the surrounding microenvironment to survive in the bone. By understanding these processes, he hopes to identify novel therapeutic strategies to eradicate and prevent bone metastasis.

JUSTL Programme

Dr Yip was unique among the JUSTL participants in that he was the only one who had applied to join, and was accepted as one of just 24 students attending, the 2014 MBL *Embryology* course. In 2014, it was celebrating its 121st anniversary, so it was an especially auspicious year to attend this world-famous course. During his time on the course, Dr Yip and the other students worked from early in the morning until past mid-night for much of the six weeks that the course ran. Lectures and laboratory courses ran for six days a week, and each week the embryology of certain model animal systems was examined, including sea urchins, fruit flies, fish, frogs, molluscs, planaria, tunicates and annelids as well as birds and mammals.

"…unlike in a PhD where you are focussed on addressing a particular research question, on the MBL course you have the flexibility to try new methods out of the confines of your home institution where you might be under pressure to generate data."

Dr Yip found his time in Woods Hole to be very stimulating. He was mentored during the course by leading experts in each animal model, and so he learned techniques that he wouldn't otherwise have a chance to work with. He said that this gave him the opportunity to explore many different research options. He said that, "unlike in a PhD where you are focussed on addressing a particular research question, on the MBL course you have the flexibility to try new methods out of the confines of your home institution where you might be under pressure to generate data." He said that there you can test even "crazy ideas". If they work out, then this is perfect…if they don't then it is not a problem. This is what makes the MBL unique in that you are encouraged to explore new and different ways of approaching research questions.

Indeed, it was spending time at the MBL, which at the time was an independent research institute rather than being affiliated with the University of Chicago, that inspired Dr Yip to join the WEHI in Melbourne. This is also an independent research institute and Dr Yip says that he can put all of his effort in his research.

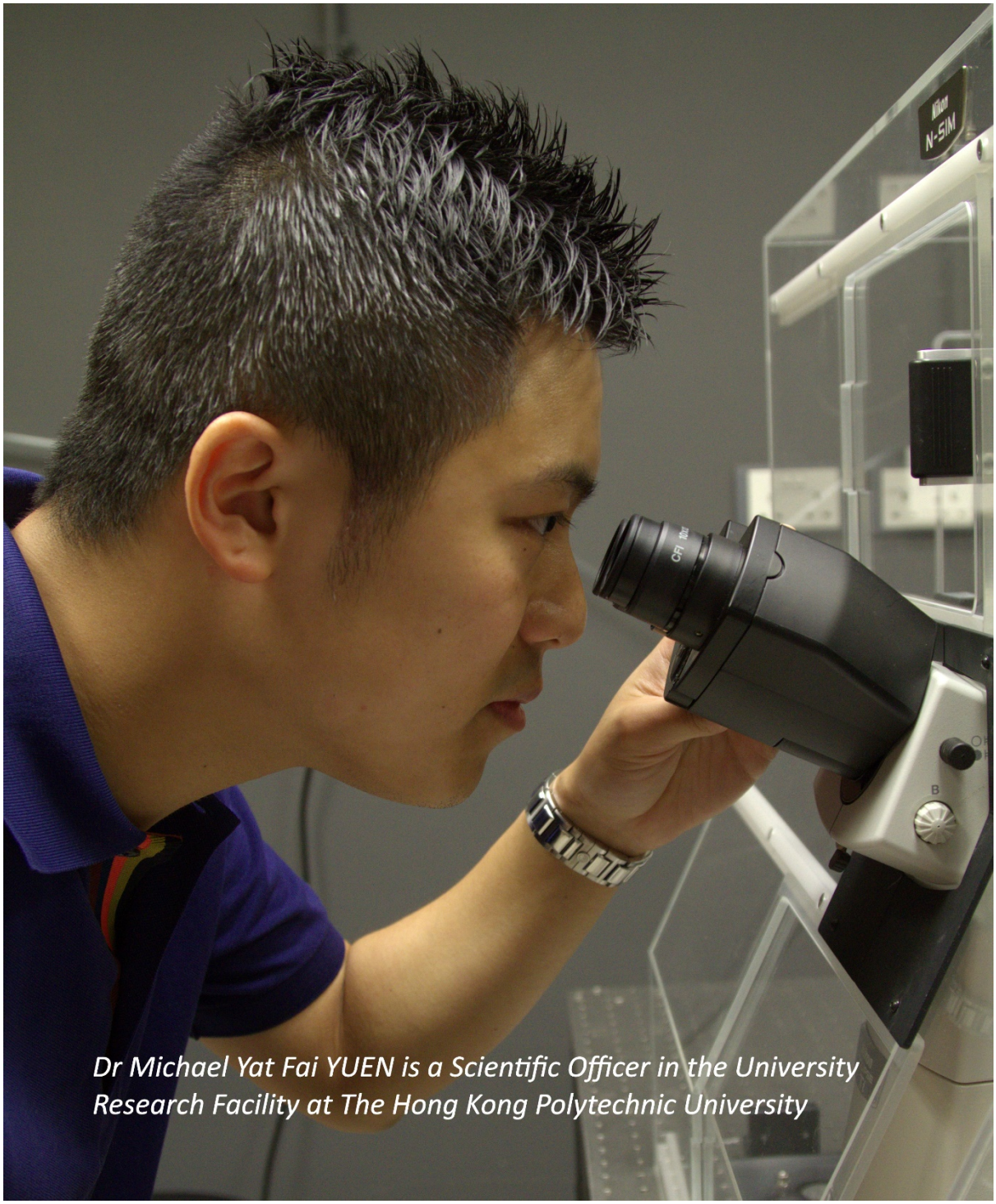
In the report Dr Yip prepared at the end of his time at Woods Hole, he summed up his experience of the *Embryology* course: "The intensity and depth of knowledge delivered in the course ...literally suffocated us….but we absolutely enjoyed every moment. The diversity of the organisms… and the choice of reagents and experiments you could try were truly overwhelming. The absence of pressure to generate publishable data in the course brought back the joy of doing science, and reminded us why we entered the scientific field."

Dr Michael Yat Fai YUEN

Dr Michael Yat Fai Yuen is a Scientific Officer in the University Research Facility in Life Sciences at The Hong Kong Polytechnic University. He graduated with a PhD in 2012 from Prof. Andrew L. Miller's laboratory in the Division of Life Science at The Hong Kong University of Science and Technology. His PhD research involved characterising the calcium signals generated in a specialized region of zebrafish embryos called the external yolk syncytial layer, which is a key component of the early stages of development. After completing his PhD, Dr Yuen conducted post-doctoral research projects first with Prof. Sookja Kim Chung at the Faculty of Medicine, The University of Hong Kong, and then with Prof. Nancy Ip in the Division of Life Science, The Hong Kong University of Science and Technology. In both laboratories he was involved in neuroscience projects, specifically investigating neurodegenerative diseases.

Current Work

At The Hong Kong Polytechnic University, the University Research Facility in Life Sciences is a core facility directly under university management, which provides services to the various departments at The Hong Kong Polytechnic University as well as other universities in Hong Kong. Dr Yuen manages a number of microscopes in the Facility including their confocal, multiphoton, light-sheet, super-resolution and live-cell imaging systems. Dr Yuen is responsible for training the users, and when a new system is installed, he develops the technique specifically for applications required by researchers at The Hong Kong Polytechnic University. He is also responsible for proposing and purchasing new equipment; for example, he is currently involved in establishing a cryogenic electron microscope facility for The Hong Kong Polytechnic University).



Dr Michael Yat Fai YUEN is a Scientific Officer in the University Research Facility at The Hong Kong Polytechnic University

JUSTL Programme

Dr Yuen was a PhD student when he attended the JUSTL programme in 2009. He spent some time working with the JUSTL Co-director, Dr Karen Crawford (St Mary's College of Maryland), where he investigated the localization of ERK (Extracellular signal-Related Kinase) protein in early squid embryos. However, he spent most of his time at the MBL working with Dr Stephen Ross, the General Manager of Product and Marketing at Nikon Instruments. Nikon goes to the MBL each summer and they provide their instrumentation and expertise both to the students attending the various courses and to other MBL researchers. Dr Yuen helped Dr Ross and his colleagues at Nikon assemble their microscopes and visit different users' laboratories to trouble shoot and help solve any problems that they encountered. This was the first opportunity that Dr Yuen had to actually see how microscopes are assembled, and it was during his time on the JUSTL programme that he developed a real interest for advanced fluorescence microscopy. Indeed, me told me that his experience at the MBL made him appreciate the fact that acquiring good microscopic images is not as easy as you might think. During his research career he has learned new imaging techniques for his various projects. He believes that now in his current position at The Hong Kong Polytechnic University, he can share the knowledge he

"..it was an invaluable time to get exposed to such a diverse and dynamic research environment where I was able to meet and work with researchers from all around the world."

has accumulated with the facility users and pass on his expertise as well as his passion for acquiring perfect images.

A keen photographer, Dr Yuen also had his photograph of Eel Pond at night, called "Night Glow", posted on the MBL Photo of the Week web-site.

This was the first time that he had travelled abroad for his studies and Dr Yuen said that he had to take care of himself in an environment very different from Hong Kong and he had to cope with problems that arose in his daily life. In addition, he had to learn how to be more independent and resourceful as a researcher. All in all, he describes his time in the MBL as being "an eye opening experience" and that "it was an invaluable time to get exposed to such a diverse and dynamic research environment where I was able to meet and work with researchers from all around the world."

Dr Mana Man Na YUNG

Dr Mana Man Na Yung is a Research Assistant Professor in the School of Science & Technology at The Open University of Hong Kong. She completed her PhD in 2016 in the The Swire Institute of Marine Science and School of Biological Sciences at the University of Hong Kong, working in the laboratory of Prof. Kenneth Leung, JP. Dr Yung's PhD project involved investigating the effect of salinity and temperature on the physicochemical and toxic properties of zinc oxide nanoparticles (ZnO-NPs; due to their use in sunscreens), in the marine diatom *Thalassiosira pseudonana*. After completing her PhD, Dr Yung stayed on in Prof. Leung's laboratory as a Post-Doctoral Fellow until 2017 during which time she continued her research on NPs and also participated in a biodiversity survey in the waters in the western part of Hong Kong. She also participated in projects on the design and implementation of an ecological shoreline.

Dr Mana Man Na YUNG is a Research Assistant Professor in the School of Science and Technology atat the Open University of Hong Kong

Current Work

Dr Yung has worked at The Open University of Hong Kong since the end of 2018. She was initially an Assistant Lecturer but has been a Research Assistant Professor since June 2019. As an Assistant Lecturer, Dr Yung was responsible for teaching half a full-time BSc course, two distant learning courses, and various laboratory classes. Now, as a Research Assistant Professor, she is still involved in teaching but she also runs her own research programme. She is currently starting to prepare grant proposals to continue some of the research she started at The University of Hong Kong on the effect of nanoparticles on algae and fish health. She also proposes to investigate the levels of nanoparticles in the waters around Hong Kong, especially in the polluted waters near to the airport and in the Pearl River Delta.

JUSTL Programme

Dr Yung joined the JUSTL programme in 2012. Her mentors were JUSTL Director, Prof. Andrew L. Miller (The Hong Kong University of Science and Technology) and JUSTL Co-Director, Dr Karen Crawford (St. Mary's College of Maryland). Dr Yung had just started her PhD studies to investigate the effect of sunscreens containing ZnO-NPs on microalgae, and while she wasn't able to obtain microalgae at the MBL, she was able to run experiments with zebrafish, an animal model that it routinely used for toxicity testing. This was the first time that Dr Yung had worked with this animal model but she quickly learned how to handle the embryos.

Dr Yung also attended various seminars and lectures. She recalls attending a seminar about how to write proposals, and being told that, "No matter if you are working for the government, in the private sector or in academia, you have to learn how to write proposals. Don't think that because you are a scientist, you don't have to worry about money. Don't think that you only need to care about your research. You have to learn how to write. Not just a research paper, but also a research proposal." This concept was very new to her; she didn't think that she had to learn to write a grant proposal because she was still a student. She thought that if she became a professor, *then* she would start to learn to write proposals, not before. However, after attending the seminar, Dr Yung changed her mind, and she took the speaker's advice to grab every opportunity to get grant writing experience, and on her return to Hong Kong, she helped Prof. Leung prepare a number of his grant proposals. This had a major impact on Dr Yung's career because when she was interviewed for the job at The Open University of Hong Kong, one of the key questions that she was asked was if she had any experience in preparing research proposals. The fact that she did, she attributes to the seminar she attended at the MBL during the JUSTL programme.

"No matter if you are working for the government, in the private sector or in academia, you have to learn how to write proposals. [ ] Not just a research paper, but also a research proposal." (Dr Yung recalling good advice she learned at a seminar).

Dr Yung describes her time on the JUSTL programme as being "unforgettable." She was especially impressed that the other researchers were so approachable and open to answer her questions. Dr Yung recalls that even during meal times in the Swope cafeteria, she could sit beside someone and they would start to talk science…"what they had done, what they were doing and what they were planning to do." The first question they usually asked her was, "What are you working on? What kind of projects are you interested in?" Then they would introduce her to people who were in the same field, and describe the resources available at the MBL that she could make use of in her experiments. Dr Yung was so impressed by this approach that she tries to generate this same type of "energetic atmosphere" for her students at The Open University of Hong Kong today. Dr Yung recalls that when she first started her PhD, Prof. Leung told her that, "You have to think about science all day except for

when you are eating and sleeping." However, Dr Yung found that when she was at the MBL, people *even* talked about science when they were eating; it was their way of life rather than simply being a routine job!

Mr Lingyu ZHOU

Mr Lingyu Zhou is a Quality Improvement Data Analyst in Dr John Kheir's laboratory at Boston Children's Hospital (Boston, MA, USA). He obtained an MPhil in 2015 from the Division of Life Science, The Hong Kong University of Science and Technology, under the supervision of Prof. Andrew L. Miller, where he was involved in developing novel tools to investigate calcium signalling during the formation of the zebrafish heart. After graduating from The Hong Kong University of Science and Technology, Mr Zhou was a Research Intern at the National Key Laboratory at Sichuan University (Chengdu, China) for 12 months, after which he went to Boston University to do a Masters in Bioinformatics degree where he studied computational biology and statistical machine learning. At the same time as working for his Masters, he was a Research Intern, first in the Bioinformatics Hub and then in Prof. Gary Benson's laboratory at Boston University.

Current Work

In his current job as a Quality Improvement Data Analyst, Mr Zhou conducts biostatistics for samples collected from patients, and he also does some software development. He is helping to create an online presence for a patient monitoring system. This position is just temporary, however, and he is currently looking for a more permanent software development position in the bioinformatics field.

JUSTL Programme

Mr Zhou was a participant in the 2015 JUSTL programme. He was mentored by Dr Charlotte Grove and Prof. Robert Baker, both of New York University Medical School. During his time at the MBL, Mr Zhou was involved in trying to map the *HoxD4a mMLV* insertional mutant in zebrafish as well as generating a *Hox4Da* mutant line of fish using CRISPR/Cas9 technology. He learned a lot of new techniques when trying to achieve these goals and found it to be a challenging summer.

"Summers at the MBL are academic feasts for all biologists, [ ] I was immersed in a broad spectrum of biological frontiers during the two months I was in the US."

Mr Zhou described his time at the MBL as being "eye-opening and educating" because there were a lot of courses and lectures happening while he was there. He recalls the Friday night lectures, and the open lectures that were part of the MBL *Physiology* course. One of the lectures that really attracted Mr Zhou's attention was by Prof. Jack Gilbert (now at University of California San Diego, CA, USA) about the microbiome. Indeed, Mr Zhou mentioned that this helped to jump-start his interest in bioinformatics because he saw how computer programming can be such a useful tool for biological research. In another lecture, Prof. Eli Eisenberg (Tel Aviv University, Israel), spoke about RNA editing in the octopus and squid, and so when Mr Zhou subsequently took the bioinformatics course at Boston University, he contacted Prof. Eisenberg and built a data base for his squid RNA information as part of his final year project. Mr Zhou summarized his JUSTL experience as follows: "Summers at the MBL are academic feasts for all biologists, [..] and I was immersed in a broad spectrum of biological frontiers during the two months I was in the US."

A few of the animal models used by the JUSTL participants at the MBL

The JUSTL Mentors

The following tables list the scientists who mentored the JUSTL participants and (as far as possible) their current affiliation. In some cases, they are working at the same university or institute today, that they were during the JUSTL programme, but in some cases they have moved. The first table shows the year-round scientists who based at the MBL; the seconds table shows the summer visiting scientists who rented laboratory space at the MBL for just 2 or 3 months from June to August, and the third table shows scientists based at institutes other than the MBL such as WHOI and the NMFS).

MBL Year-round Scientists

Name	Current affiliation	JUSTL participant + year
Dr Irina ARKHIPOVA	The Josephine Bay Paul Center for Comparative Molecular Biology & Evolution	Kosmo Ting Hing YAN (2011)
Dr Nicholas BLAND	*The Josephine Bay Paul Center for Comparative Molecular Biology & Evolution	Helen Hok Lun MA (2010)
Dr Robert K. CAMPBELL	The Josephine Bay Paul Center for Comparative Molecular Biology & Evolution	Helen Hok Lun MA (2010)
Dr Marko HORB	National *Xenopus* Resource	Edward Tak Chuen LAU (2013) Helen HAO (2015) Ho Chi LEUNG (2014, 2015)
Dr Alan M. KUZIRIAN	The Eugene Bell Center for Regenerative Biology and Tissue Engineering	Tim Yue Him WONG (2010) Ian Wing Yin MO (2012) Jacky Tin Shing HUNG (2013)
Dr Roxanna SMOLOWITZ	Formerly MBL veterinarian, now at Roger Williams University	Summer Min SHEN (2007)
Dr Daniel WARD	*Marine Resources Center	Hongmei JING (2010)

MBL Visiting Summer Scientists

Name	Current affiliation	JUSTL participants mentored
Prof. George AUGUSTINE	Lee Kong Chian School of Medicine, Nanyang Technological University, Singapore	Junyu XU (2007)
Prof. Robert BAKER	Professor Emeritus, Dept. Neuroscience and Physiology, NYU Medical School, New York, NY, USA	Cora Sau-Wan LAI (2007) Jack Wai Ho TANG (2008) Vincent Chin Wai KWAN (2009) Johnson Kai Yu NG (2009) Franki Kai-Hei TSE (2013) Idy Hiu-ting HO (2014) Lingyu ZHOU (2015) Helen HAO (2015)

Prof. Scott BRADY	Dept. Anatomy & Cell Biology, University of Illinois at Chicago, Chicago, IL, USA	Tori Nan XIAO (2007) Chi Wai LEE (2012) Franki Kai-Hei TSE (2013) Idy Hiu-ting HO (2014)
Dr Joseph D. BUXBAUM	Icahn School of Medicine at Mount Sinai Medical, New York, NY, USA	Kit Man TSANG (2010)
Dr Fred CHANG	University of California San Francisco, SF, USA	Danny Ka Chun FUNG (2008)
Dr Karen CRAWFORD	Dept. Biology, St. Mary's College of Maryland, St. Mary's City, MD, USA	Alice LIE (2007) Raymond Kwan Keung LEUNG (2008) Michael Yat Fai YUEN (2009) Sarah E. Ho (2012) Mana Man Na YUNG (2012)
Dr Paola DIVIETI-PAJEVIC	Boston University School of Dental Medicine, Boston, MA, USA	Jacky Tin Shing HUNG (2013) Harvey Yin Seng CHAN (2014)
Dr Robert FISCHER	National Heart, Lung & Blood Institute, National Institutes of Health, Bethesda, MD, USA	Penny Pui Ying LAM (2011)
Prof. Robert D. GOLDMAN	Dept. Cell & Developmental Biology, Northwestern University Medical School, Chicago, IL, USA	Stephanie Wai Kwan LAM (2008)
Dr Charlotte GROVE	New York University, New York, NY, USA	Lingyu ZHOU (2015)
Prof. Raymond E. KELLER	Dept. Biology, University of Virginia, VA, USA	Ho Chi LEUNG (2014)
Prof. Joseph G. KUNKEL	University of New England, Biddeford, ME, USA	Jacky Tin Shing HUNG (2013)
Prof. Rudolfo LLINÁS	Professor Emeritus, Dept. Neuroscience and Physiology, NYU Medical School, New York, NY, USA	Jacque Pak Kan IP (2012)
Prof. R. Paul MALCHOW	Dept. Biological Sciences, University of Illinois at Chicago, Chicago, IL, USA	Jack Wai Ho TANG (2008)

Prof. Andrew L. MILLER	Division of Life Science, The Hong Kong University of Science and Technology, Hong Kong	Jack Wai Ho TANG (2008) Chris Yuk Kam Cheung (2008) Mana Man Na YUNG (2012) Harvey Yin Seng CHAN (2014) Jeffrey J. KELU (2012) Jacky Tin Shing HUNG (2013) Franki Kai-Hei TSE (2013) Jason KAN (2014) Ho Chi LEUNG (2014, 2015)
Dr Nagwa MOHAMMADY	Dept. Botany and Microbiology, Alexandria University, Alexandria, Egypt	Connie Pui Ling LAU (2009)
Prof. Enrico NASI	National University of Colombia, Bogotá, Colombia	Tori Nan XIAO (2007)
Dr Alessandro RUBINACCI	Bone Metabolism Unit, San Raffaele Hospital, Milan, Italy	Jacky Tin Shing HUNG (2013) Harvey Yin Seng CHAN (2014) Jason KAN (2014)
Prof. Alexander F. SCHIER	Department of Molecular and Cellular Biology, Harvard University, Boston, MA, USA	Idy Hiu-ting HO (2014)
Mr Alan SHIPLEY	Applicable Electronics, New Haven, CT, USA	Jacky Tin Shing HUNG (2013) Harvey Yin Seng CHAN (2014) Ho Chi LEUNG (2014) Jason KAN (2014)
Dr Mark TERASAKI	Dept. Cell Biology, University of Connecticut Health Center, Farmington, MA, USA	Katherine Yueping QIAN (2007) Steve Hiu Chi CHONG (2010)
Dr Clare WATERMAN	National Heart, Lung & Blood Institute, National Institutes of Health, Bethesda, MD, USA	Penny Pui Ying LAM (2011)
Dr Sarah E WEBB	Division of Life Science, The Hong Kong University of Science and Technology, Hong Kong	Jeffrey J. KELU (2012)
Dr Joshua J. ZIMMERBERG	Lab. of Cellular & Molecular Biophysics, National Institute of Child Health & Human Development, Bethesda, MD, USA	Katherine Yueping QIAN (2007)
Dr Steve ZOTTOLI	Dept. Biology, Williams College, Williamstown, MA, USA	Katherine Yueping QIAN (2007)

Scientists from WHOI, NMFS and other US-based institutions

Name	Current affiliation	JUSTL participants mentored
Dr Michael V. JAKUBA	Deep Submergence Laboratory, Applied Ocean Physics and Engineering, WHOI	Tjasa BOH WHITEMAN (2014)
Dr Scott LINDELL	Applied Ocean Physics and Engineering, WHOI	Connie Pui Ling LAU (2009) Hongmei JING (2010) Clare Hau In LUN (2011)
Dr Richard MCBRIDE	Population Biology Branch, National Marine Fisheries Service, Northeast Fisheries Science Center, NOAA	Ian Wing Yin MO (2012)
Prof. James SALZER	Langone Medical Center, New York University, NY	Graham Ka Hon SHEA (2009)
Dr Timothy M. SHANK	Molecular Ecology and Evolution laboratory, WHOI	Ling Ming TSANG (2008) Sharon Tsz Huen WU (2009) Stella Sze Wai CHAN (2011)
Dr Ann TARRANT	Dept. Biology, WHOI	Jacky Chun-kit KWOK (2011)

Note 1: A number of the JUSTL participants worked under the supervision of more than one mentor during their time on the JUSTL programme.

Note 2: Karen Wing Man LEE, Maggie Wai Ming LI and Stanley Chun Kwan LAU worked on their own projects, and Raymond Ko Ho YIP attended the MBL summer *Embryology* course, so as they did not have a formal mentor, they are not listed in this table.

Note 3: Asterisks indicate mentors' former affiliation. Current affiliation not know.

Mentors' Comments

I invited a number of the JUSTL mentors if they could give me their views about the programme and about the participants who worked with them. Their comments are shown below.

Dr Scott Brady (UIC Distinguished Professor, Department of Anatomy and Cell Biology, University of Illinois at Chicago, Chicago, IL, USA).

Mentored: Tori Nan XIAO, Chi Wai LEE, Franki Kai-Hei TSE, & Idy Hiu-ting HO

"Having maintained a summer research programme at the Marine Biological Laboratory since 1982, I have benefited from the efforts of many student visitors (both graduate and undergraduate students) who spent time in Woods Hole and helped us to generate critical data. One of the rewards of maintaining my summer research is the opportunity to work closely with students at the bench, engaging them in frontline research. When Professor Miller first approached me about hosting students, I immediately agreed and never regretted my decision. The students from the JUSTL programme were particularly memorable as bright, enthusiastic students that were eager to learn. Since the JUSTL students came from varied backgrounds, the experience was enriching for both the JUSTL students and their American counterparts that were also working in the laboratory. Despite the distance, some of the JUSTL students have stayed in touch and I always enjoy hearing how their careers have advanced. Needless to say, I was sorry when the programme ended in 2015 and hope that a similar programme could be created to continue bringing Chinese students to Woods Hole for a research experience."

Dr Scott Lindell (Research Specialist, Woods Hole Oceanographic Institution, Woods Hole, MA, USA)

Mentored: Connie Pui Ling LAU & Hongmei JING

"I have fond memories of mentoring Connie and Hongmei.

Hong Kong students are particularly well-prepared for working in modern biological laboratories. My projects involved the cultivation of microalgal strains and prospecting for ones with the most potential for producing lipids of economic utility. Connie and Hongmei exercised excellent sterile culture habits. They organized efficient methods of evaluating the strains with cellular stains. All in all, their successes helped propel our success in publishing, and my continuing on a research path of "algae to bio-fuels" which continues to this day."

Roxanna Smolowitz DVM (Associate Professor, Roger Williams University, Bristol, RI, USA)

Mentored: Summer Min SHEN

"Very little was known about the number and types of blood cells in fish and nothing was known about blood cells in toadfish (*Opsanus tau*), an important research animal at the MBL. Summer's work was very helpful in gaining an understanding the types and numbers of blood cells of the toadfish. This information helps in determining and maintaining the health status of the fish maintained in aquatic holding tanks at the MBL. Additionally, Summer was a committed, conscientious student and a pleasure to work with."

Dr Ann M. Tarrant (Associate Scientist with Tenure, Biology Department, Woods Hole Oceanographic Institution, Woods Hole, MA, USA)

Mentored: Jacky Chun Kit KWOK

"I was surprised when Andy Miller contacted me about possibly hosting a student in the lab through the JUSTL programme. I hadn't heard of the programme before and wasn't sure what to expect. He connected me with Jacky Kwok, a graduate student with interests in marine toxicology. Jacky completed a project in which we studied the effects of combined environmental stressors (chemical pollutants and UV radiation) on a sea anemone. The project was environmentally relevant because marine animals living in shallow water often experience this combination of stressors in their natural environment. Jacky's project was exhausting because it required lab work during both day and night to make sure the experimental animals were continually exposed to the test chemicals. He never complained, but I think he was getting pretty worn out toward the end and maybe wondered whether it would be worth it. The fatigue melted away after the experiment was completed and he began analyzing the samples to learn how the animals had responded to the stressors. I was very impressed with Jacky's lab skills. I quickly learned that I could trust him to accurately calculate chemical concentrations, develop experimental protocols, and analyze complicated arrays of samples. In the end we found that the anemones responded very strongly to UV radiation and even more strongly to the combination of stressors. We published this work in the Journal of Experimental Biology with Jacky as a co-author."

Alessandro Rubinacci, M.D. (Head, Osteoporosis and Bone Metabolism Unit, Scientific Institute San Raffaele, Milan, Italy)

Mentored: Harvey Yin Seng CHAN, Jacky Tin Shing HUNG, & Jason Wing-yiu KAN

"It's a pleasure to be able to write about the JUSTL programme. I met the JUSTL students - Jacky Hung, Harvey Chan and Jason Kan - in the summers of 2013 and 2014, during my visiting at the Marine Biological Laboratory (MBL) in Woods Hole, Massachusetts for a collaborative research with Prof. Andrew L. Miller of the Hong Kong University of Science and Technology, Director of the JUSTL programme, together with Professors Joseph G. Kunkel of the University of New England, and Paola Divieti Pajevic of the Boston University, USA.

The JUSTL students were involved in our advanced study on the regulation of calcium metabolism in neonatal mice by applying the scanning ion-selective electrode technique (SIET) to measure calcium and protons fluxes at the bone-plasma interface in living bones maintained *ex vivo* in physiological conditions after targeted modifications of the PTH receptors in osteocytes. During the study, the students demonstrated a high scientific interest, outstanding technical skills in complex and demanding experimental systems, and critical capacity in solving the relevant difficulties as well as great enthusiasm in participating in the scientific discussions.

From a mentor's perspective, I found the JUSTL programme very educative and insightful. In the setting of the JUSTL programme, all the students found an optimal scientific environment where they had the opportunity to integrate into their different areas of expertise, scientific fields, and international networks of the research team, and of the host institution. In this setting, the students all showed promise for a successful career in research. The JUSTL programme was highly effective and established the experimental basis for two publications in the journals, *Bone* and *Fisheries Science*."

Drs Clare M. Waterman (NIH Distinguished Investigator and Director of Cell Biology and Physiology Center), and Robert Fischer (Staff Scientist), National Heart, Lung and Blood Institute, National Institutes of Health, Bethesda, MA, USA.

Mentored: Penny Pui Ling LAM

"During our 2012 collaborative summer research work at the MBL, we were fortunate to work with the JUSTL Fellow, Penny Lam, who came to us via a collaboration with her mentor, Dr Anna Huttenlocher. Penny, an expert in zebrafish embryology and transgenesis, came to work with us to learn to do live confocal intravital microscopy and digital image analysis. Penny was an enthusiastic learner and was both skilled with her hands and adept at critical thinking. These traits, coupled with her bright personality made it a joy to work with her for the summer. In fact, we learned as much from her as she did from us, and we continued on with the collaboration with her and Dr Huttenlocher to author three research papers from our time there at MBL. The active intellectual environment at the MBL played a great role in fostering this collaboration, such that we have initiated several other similarly productive collaborations at the MBL in the years since working with Penny."

Dr Alan M. Kuzirian (Associate Scientist, Marine Biological Laboratory)

Mentored: Tim Yue Him WONG, Ian Wing Yin MO & Jacky Tin Shing HUNG

"I participated in the JUSTL programme, Marine Biological Laboratory, Woods Hole, MA-USA for the years, 2010, 2012, 2013. I served as a mentor to one student each of those summers. Our Research Associate, George Bell also assisted.

I can say without reservation that the total JUSTL experience was very productive and enjoyable. All the students I mentored and with whom I came in contact were excellent. They were enthusiastic, very receptive to the materials presented and very intellectually capable. They were all totally successful during their time at the MBL which included lab work, obtaining and reading reference materials, to their final execution of oral/visual presentations at the end of the summer.

Their experiences were not all science and work. Woods Hole is very culturally diverse especially during the summer when people from all areas of the world come to attend courses and carry out research. JUSTL students adjusted readily to living in this totally diverse mix of people. It was a personal pleasure for me to share cultures and customs with them, to learn from them what was important to their lives and what future goals they wished to achieve. I am so pleased to have been able to participate in some small way to their education and life experiences.

My only regret is that the programme ended and new JUSTL students no longer come to us at the MBL. I fully understand the rigors that programmes like JUSTL require, but I would suggest that if possible, it be reinstated, both for the students' career development, as well as the pleasure and fulfillment for us as mentors."

Concluding Remarks

I hope that from this review of the JUSTL programme, you can see that it had positive life- and career-changing effects on many of the JUSTL participants. Interestingly, the participants were inspired by different aspects of the programme.

For some, the JUSTL programme had a real career-changing effect. For example, Dr Tori Xiao was in the middle of her PhD training during the JUSTL programme. She had previously completed courses in dentistry and was aiming to continue her dental training after completing her PhD. However, after the JUSTL programme she decided stayed in academia and is now an Assistant Professor at the Arthur A. Dugoni School of Dentistry at the University of the Pacific.

Dr Raymond Leung also made a life-changing decision during his time on the JUSTL programme. At the time, he was struggling to decide whether to continue with a research career after finishing his PhD or stay in education and go to medical school. However, after a conversation with his JUSTL mentor, Prof. Karen Crawford, he realized that he really wanted to be a doctor, and this is the career path that he followed on his return to Hong Kong. He has just recently started his Senior Residency training in Tai Po Hospital, specializing in Psychiatry.

Dr Katherine Qian also made a career-changing decision after attending the JUSTL programme, when she decided that she was more interested in the application of science rather than in basic research and so after completing her PhD, she made a move to industry and she is now a Senior Clinical Manager at Intuitive Surgical-Fuson Medical Technologies in Shanghai.

In some cases, JUSTL participants did especially well in their laboratory-based work and were subsequently named as co-authors on publications prepared by their mentors. The contributions of Dr Penny Lam, Ms Connie Lau, Mr Jacky Hung and Dr Jacky Kwok were all recognized in this way.

For a number of people, the JUSTL programme gave them the opportunity to learn a new technique. This was where Dr Jacque Ip was first introduced to the advantages of using two-photon imaging to visualize neuronal dendrites *in vivo*, and where Dr Ian Mo and Dr Tim Wong first learned histological techniques. Drs Ip, Mo and Wong are still using these methods in their research today.

Several people were inspired by the lectures and workshops they attended during the JUSTL programme. Indeed, Dr Cora Lai probably wins the prize for the most number of lecture attended – 55 – during her 8 weeks at the MBL!

Drs Helen Hao and Idy Ho were both inspired by the prestigious Friday evening lectures. Indeed, Dr Ho was so interested in the way that a world-class scientist could explain their research findings in language simple enough for even young children to understand, that she was motivated to participate in several STEM (Science, Technology, Engineering and Mathematics) courses for secondary school students when she was back in Hong Kong.

While each of the JUSTL participants got something different out of the JUSTL programme, everybody seemed to be impressed by the number of world-class researchers who spend their summers in Woods Hole, and by the fact that they were all approachable and friendly, and they took a real interest in the students' research and education. The JUSTL participants were also very impressed by the diverse and dynamic nature of the research environment at the MBL as well as the cooperation and collaboration between laboratories. Many of the people who I spoke to, told me that they had such an amazing experience on the JUSTL programme that, given the opportunity, they would like to go back to Woods Hole to experience the summer season once again.

Acknowledgements

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