Knowledge Exchange

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NEWSLETTER

Impact

Innovation and Entrepreneurship

Engagement for Community Benefit

News in Brief

A Champion of Trees

"In most of my research papers, I include paragraphs on how the science can inform policies and practices."

Professor C Y Jim at the Sky Woodland at CLP's Chui Ling Road substation

Trees in Hong Kong have never had it easy. Limited space, development pressures and an unclear system for protecting them means they are often at risk of being chopped down or poorly maintained. Fortunately, they have a strong advocate in Professor CY Jim, Chair Professor of Geography.

Over the past three decades, Professor Jim has been researching and speaking out for Hong Kong's trees. He started by calling for protection of the magnificent large old trees he dubs "champion trees", which eventually led the Hong Kong government to set up a registry for these trees and inspired the Singapore government to go even further and set up a system to designate and protect the Lion City's champion trees.

Professor Jim has also lobbied for years for a tree ordinance in Hong Kong and although this has not yet been adopted, many of its components have been – especially after a fatal tree collapse case in 2008. The government has set up a Tree Management Office and started training personnel in proper tree management, and it has appointed Professor Jim to the government's Expert Panel on Tree Management.

"When trees are in trouble they can easily hurt people, so I still think Hong Kong should have a tree ordinance to ensure the standards of tree management reach international best practices in all aspects," he said.

An important contributor to healthy trees is healthy soil and Professor Jim has also made scientific and practical contributions in this area. He conducted detailed soil analysis of samples from more than 100 sites and, as honorary advisor to the government's Greening Master Plan Committee, he persuaded the Civil Engineering and Development Department to improve the soil before planting more trees.

"Urban soil in Hong Kong, particularly at roadsides, has very poor quality. A lot of it is construction rubble with all sorts of artificial fragments and contaminants that are entirely unsuitable for tree growth. Soil must be improved – or even better, replaced – to nourish strong, healthy and safe trees," he said.

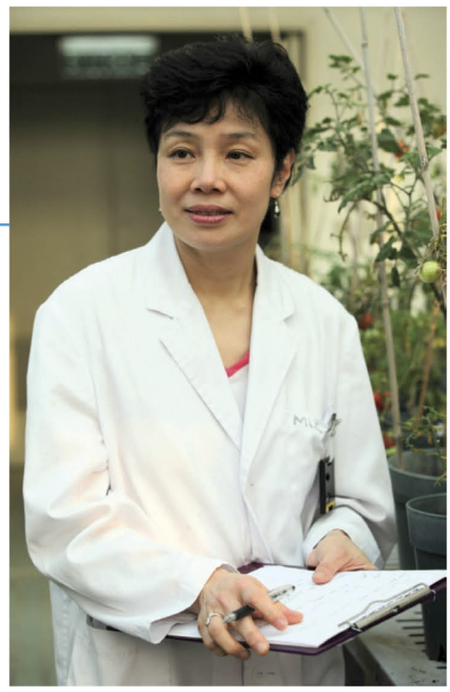
Professor Jim also did a two-year project for the Hong Kong Housing Authority in which he and his team checked the conditions of 46,000 trees and developed a new tree management plan. He has also done several groundbreaking projects to green buildings. These include a green roof project at 14 schools that has since been replicated in many schools and other sites; a green wall project for the Drainage Services Department that enabled him to test different climber species for Hong Kong's climate and growth conditions; and a green roof-cum-wall project at a substation of CLP Power Hong Kong Ltd, where he has planted a woodland of native species on the roof and wrapped the building with climbers. He is now doing detailed micro-climate monitoring at that site.

Professor Jim is also in the midst of one of the most detailed studies of artificial turf in the world and is showing that this material contributes to the urban heat island effect and emits harmful gases. To this champion of the green, a natural turf is a much better option for the environment and for health.

His scholarly contributions were recognised in 2014 when he became the first Asian scientist to receive the L.C. Chadwick Award for Arboricultural Research presented by the International Society of Arboriculture.

"In most of my research papers, I include paragraphs on how the science can inform policies and practices. I'm happy that my findings can have practical applications and impact beyond the academia," he said.

Engineering Plants for a Brighter Future



Professor Mee-Len Chye

Climate change and population growth are the twin challenges over our time. How do we feed a growing population (expected to increase by two billion people by 2050 according to the United Nations Department of Economic and Social Affairs) when the conditions for plant growth are becoming more difficult? Plant biologists at HKU are offering help with two new technologies, one that can improve the ability of plants to cope with drought and another that improves crop productivity while reducing carbon dioxide emissions.

The technologies have emerged from the School of Biological Sciences, where researchers have genetically engineered the plant *Arabidopsis thaliana*, thale cress, in two separate projects.

Professor Mee-Len Chye, Wilson and Amelia Wong Professor in Plant Biotechnology, boosted expression of the ACPB2 protein in the plant, which enabled it to retain more water and enhance its drought tolerance. The technology has been licensed to the US-based agribusiness, Agragen, and she hopes to extend the findings to crop plants.

"When we started I could not foresee that this class of protein would confer stress tolerance in plants – nobody knew," she said. "Drought tolerance is an extremely useful characteristic because it can allow us to extend the area in which plants are grown."

Separately, Professor Chye has also manipulated another protein in the same family to enable transgenic Arabidopsis flowers withstand freezing temperatures. "Finding ways to protect plants from environmental stress is an important research area given that plants form critical components in food webs and food chains," she said.

Plant biologists at HKU offer two technologies that may help address climate change and crop productivity.

Meanwhile, Associate Professor Dr Wallace BL Lim discovered a novel plant growth promoting gene, PAP2, which is present in the genomes of most plants including *A. thaliana*. His team was the first to study the gene's function and showed that the gene can speed up plant growth and increase yield in *Arabidopsis thaliana* (seed yield +38-57%), *Camelina sativa* (a biofuel crop, seed yield +50-110%) and potato (tuber yield +50%) by promoting photosynthesis. Agragen has licensed the right of this gene in *Camelina sativa*.

"I am curious to see if this technology can be applied to trees and green algae. If it works in these organisms, they might increase carbon dioxide absorption and reduce CO2 accumulation in the atmosphere," Dr Lim said.

Taken together, these achievements are important contributions to the question of how to feed people in future. "Currently our biggest challenge in terms of global population growth is how to feed more people without further damaging the planet," Professor Chye said. "We need to increase food production by 70 per cent in the next 40 years and genetic modification is an important tool to use, together with traditional plant breeding."

Dr Wallace Lim (left) holding the control Arabidopsis thaliana *and Dr Yeesong Law of his team (right) holding the experimental* Arabidopsis thaliana *with PAP2 technology, both plants were 4 weeks old*

Wearable Technology for Industry

The Apple watch and Google glasses have made wearable technology hot products in the consumer market, and now HKU postgraduate students are carving a niche in this cutting-edge field.

Their startup, Comma Technology Ltd, is focused on portable and wearable technology for logistics and manufacturing industries that can track everything from goods in a warehouse to machine maintenance schedules. The possibilities also extend to fields such as healthcare (to facilitate caregivers in the hospital wards) and retailing (tracking items on the shopping malls).

"There has been a boom in wearable technology in the consumer field but it's not very well-developed in business-to-business," said Leon Kong, project leader and a PhD student at HKU. "We see opportunities and a demand for smart devices that can capture data and improve information communication and sharing.

"For example, in large manufacturing plants you still see staff using traditional pen and paper to keep records of machine status and sensory data like temperature and humidity. Or in warehouses you can see workers pushing a trolley with a computer to collect data that then has to be brought back to the computer centre. We're working on devices that are cheaper and easier, and can be easily used for big-data analytics."

So far they have developed a smart pen that is fitted with a small inexpensive chip. This chip is customised to each firm's needs, so it captures only information essential to the operation at hand and feeds that back to the firm's central system. The chip works with RFID tags and barcodes and also can collect sensory data. The pen, priced at HK$2,500-$4,500 each, will have its first industrial application this spring.

The design philosophy of new wearable product – smart glove, has been tested in a warehouse where workers just had to pass their hand across the AutoID tags to collect and transmit information to the company's main system.

"We offer two innovations," Mr Kong said. "First we free the hands. Second we provide users with important information by managing the distractions. Everyone on our team has knowledge and experience in this field so we can provide a more tailor-made service. Our supervisor, Professor George Q. Huang, gives us strong guidance on technology innovation and application as well. Plus we are creative."

Comma placed highly in three major technology and innovation competitions in Mainland China, including a second-place finish against more than 1,780 competitors at the 7th Shenzhen Entrepreneurship and Innovation competition.

The firm has also won two rounds of HKU's Technology Start-up Support Scheme for Universities (TSSSU@HKU) funding and is applying for a third round (the maximum allowed under the fund), and it is finalising details for venture capital funding.

"Our vision is to provide enterprises with safe, efficient and friendly solutions for data collection, to bring the innovation of "wearables" into the industry sectors and to support the transition from Industry 2.0 to Industry 4.0.," Mr Kong said.

The startup, Comma Technology Ltd, is focused on portable and wearable technology for logistics and manufacturing industries.

The Comma Technology team together with Professor George Huang of the HKU Department of Industrial and Manufacturing Systems Engineering

Docks and waterfront at Yangon River (image source: Ivan Valin)

Capacity Building in Myanmar

Yangon, the capital of Myanmar, has the largest existing example of colonial architecture in the world and, as the country opens up, it is now-or-never if that legacy is to be protected. HKU's Faculty of Architecture is contributing to that aim by assessing the city's architecture, advising authorities and helping to develop expertise.

The Faculty's association with Myanmar began around early 2013 with a conservation programme involving the NGO Yangon Heritage Trust to develop a strategy for preserving architectural treasures in the heart of the city, where money is flowing in and the impulse is to tear down and build anew.

The arrival a few months later of current Dean and Chair Professor in Urban Planning and Development Economics, Christopher Webster, accelerated the Faculty's involvement as he saw an opportunity for making a difference on an even broader scale.

The Faculty has since forged links with the Yangon Technical University (YTU), Yangon Urban Council and other bodies for both teaching and knowledge exchange programmes. It recently signed an agreement with the Ministry of Construction and YTU to allow for staff exchange, student exchange, joint teaching and other capacity building activities. The Faculty has also sent box-loads of books to restock YTU's library.

The Faculty of Architecture is making a difference to Yangon and regards its engagement with Myanmar as a multi-year commitment.

Individuals and individual units in the Faculty are also making a difference. Conservation specialist Dr Lynne DiStefano is a member of the governance body of the Yangon Heritage Trust. The Faculty's StudioMYANMAR, which creates learning opportunities in the country, has held eight studio projects including one that is linked to a contract research project by two Assistant Professors of Landscape Architecture, Dorothy Tang and Ashley Scott Kelly, who are developing a regional landscape plan in the south of the country that encompasses a highway corridor, game parks and mining and industrial developments.

The Faculty is also receiving students from Myanmar for its Masters in Urban Planning programme, who are being supported by the Asian Development Bank.

Professor Webster said the Faculty regarded its engagement with Myanmar as a multi-year commitment, and they had attracted considerable interest and support from partners in Myanmar, Hong Kong and internationally.

"The world's capitalists are knocking on the door of Myanmar – and so are the world's urbanists, the architects and planners," he said. "There is a real appetite amongst our younger colleagues in particular to work in Southeast Asia and extend the outreach work we have been doing in Mainland China."

A Step Up for Little People

Little People of Hong Kong (LPHK) works with HKU in this KE project to promote better understanding of the needs of Little People

Patients with rare bone diseases that cause extremely short stature used to struggle alone with the pressure of being different, whether it was losing out on school places or jobs or navigating facilities that were outsized for their needs. A project supported by the KE Fund is helping to ease their path by providing support for patients and their families and promoting greater acceptance by society.

The Little People Care Alliance KE Project is a partnership between HKU and Little People of Hong Kong (LPHK), which represents patients and their families. Professor Danny Chan, the project co-ordinator and an expert in bone disorders from the School of Biomedical Sciences, represents HKU, while LPHK is represented by Serene Chu, whose son has dwarfism (one type of rare bone disease) and who has been motivated in part by the heartache and rejection she experienced simply finding a kindergarten to admit her son.

While the initial aim of the alliance was to bring patients and families together to support each other, Professor Chan said they quickly realised they needed to think a lot more broadly if they wanted to make meaningful improvements to patients' lives.

"Having a foundation is good because it supports patients, but at the end of the day, we wanted to change the mindset of Hong Kong people and the government. This will take a long time, our target is the next generation," he said.

The alliance organised a symposium last year for more than 150 school principals, teachers and students to start raising awareness and getting them to think about how they could make their schools more welcoming to little people.

This was followed up with the publication earlier this year of the booklet "Little but Not Less: Understanding Rare Bone Disorders", which is aimed at the general public. It provides information on these disorders, personal stories from patients and their parents, and stories of triumph over adversity, such as a patient with dwarfism who became a university researcher and a badminton player who is ranked world's No. 5 in the Men's Singles short stature group.

"Having a foundation is good because it supports patients, but at the end of the day, we wanted to change the mindset of Hong Kong people and the government."

The booklet was launched on world Rare Disease Day in February 2016 at an event attended by Dr York Chow, then Equal Opportunities Commission chairman. It will be distributed to all schools in Hong Kong, government bodies and other public organisations, and it has been uploaded to LPHK's website www.lphk.org

Dr Chow spoke at the event and neatly summarised the importance of this initiative: "Only with understanding can we put down prejudice and only with care and acceptance can people with different abilities realise their potential," he said.

130 people including patients, patient's families and volunteers attended the book launching party

Dental students performing dental examination for the participants, with Professor Edward Lo (far right) overseeing the work

Dental Help for the Homeless

HKU dental students are using their training to help the most underprivileged people in society – the homeless and those who have little material wealth or resources.

Working with St Barnabas Society and Home, which provides meals and temporary accommodation to people in need, the students have provided basic dental care and oral health education to those who could otherwise not afford to see a dentist.

They held two sessions, in 2014 and again last year, and provided basic clinical examinations and treatments such as topical fluoride treatment, simple fillings and identifying further treatment needs for about 60 service clients selected by St Barnabas. They also provided them with individual consultations on oral health.

Professor Edward Lo Chin-man, Chair Professor of Dental Public Health in the Faculty of Dentistry, oversaw last year's sessions in which both postgraduates and senior undergraduates participated.

"We were able to work efficiently because our collaborator, St Barnabas, has experience with these clients and was able to explain to them what to expect from us and what the limitations were. We could not do everything in their centre, but we were able to perform basic treatments that they needed urgently and give them information on how to seek subsidised dental services, for example, if they needed extractions or false teeth," he said.

"We are not just providing treatment and service for their teeth and oral health knowledge; we have to show we care and talk to them."

Most of the subjects were older adults who may have gone to a dentist in the past but for personal or financial reasons were no longer able to do so. Apart from managing the clients' expectations, Professor Lo said the students also had to be prepared for dealing with this group.

"The clinical procedures we did there were not complicated, although we had to modify some techniques because we did not have access to a full range of equipment. But what the students really needed to learn was how to have a caring attitude for these poor people. We are not just providing treatment and service for their teeth and oral health knowledge; we have to show we care and talk to them. We tried to prepare the students by telling them not to be surprised that the clients had neglected their oral health because they also had a lot of other problems to handle. After all, they are a neglected group in our affluent society. We're trying to lessen their burden, not aiming for perfect restoration of their oral health."

Both the recipients and St Barnabas were happy with the project and Professor Lo said he hoped they could repeat it this summer.

The project was supported by the KE Fund, while toothpaste companies also donated toothbrushes and toothpaste to distribute to the recipients.

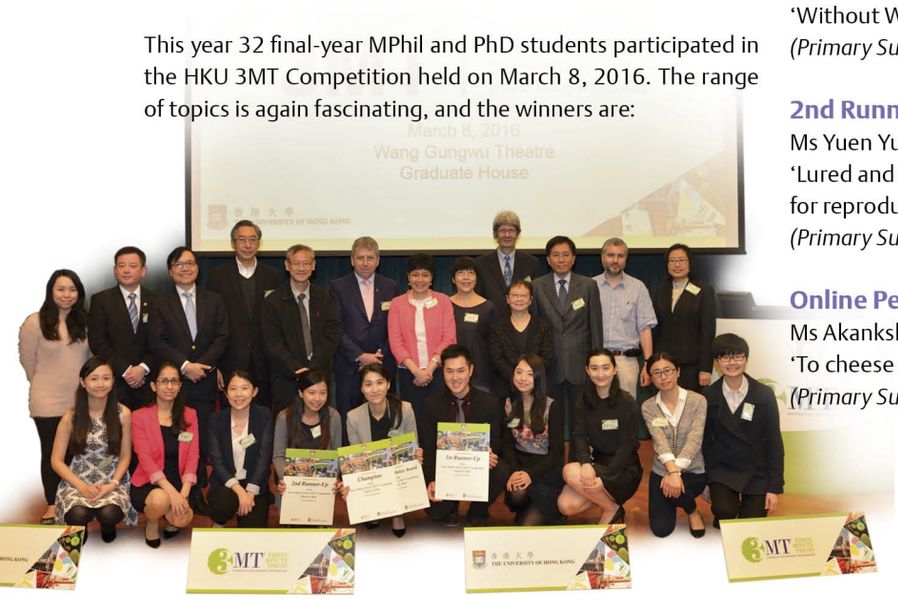
Open Innovation and Public-Private Partnerships

Professor Raj Thampuran, Managing Director, Agency for Science, Technology and Research (A*STAR), Singapore, gave a public lecture entitled "Open Innovation and Public-Private Partnerships" at HKU on January 25, 2016. Professor Thampuran elaborates on the importance of R&D and innovation for Singapore's economic transformation and growth, and A*STAR's role in Singapore's innovation system, as the primary mission-oriented government agency tasked with advancing innovation-based growth. The video of his talk is available at www.ke.hku.hk/events/others/PublicLecture

HKU Three Minute Thesis (3MT®) Competition 2016

The 3MT Competition is an academic competition that challenges research postgraduate students to explain their research within 3 minutes to a general audience, using only one static PowerPoint slide. The 3MT was developed by The University of Queensland, Australia in 2008. The HKU 3MT Competition has been an annual event jointly organized by the Graduate School and the Knowledge Exchange Office since 2011.

This year 32 final-year MPhil and PhD students participated in the HKU 3MT Competition held on March 8, 2016. The range of topics is again fascinating, and the winners are:



Champion and People's Choice Award Winner

Ms Xiaoxin DU, PhD candidate in the Faculty of Education
'Torn Apart: Role Split Phenomenon in Chinese Higher Education'
(Primary Supervisor: Professor Wing Wah Law)

1st Runner-up

Mr Ricky Van Yip TSO, PhD candidate in the Faculty of Social Sciences
'Without Writing—Can We Learn to Read Chinese?'
(Primary Supervisor: Dr Janet Hui Wen Hsiao)

2nd Runner-up

Ms Yuen Yung LAU, PhD candidate in the Faculty of Science
'Lured and trapped: how plants can imprison beetle pollinators for reproduction?'
(Primary Supervisor: Professor Richard M.K. Saunders)

Online People's Choice Award Winner

Ms Akanksha GANDHI, PhD candidate in the Faculty of Science
'To cheese or not to cheese...?'
(Primary Supervisor: Professor Nagendra Shah)

Videos on the presentations of the awardees and finalists can be viewed on our 3MT website: www.ke.hku.hk/hku3mt

Finding Experts

The **HKU Scholars Hub** is the University's online expertise directory, which makes HKU researchers and their research visible. It provides an expert finder for businesses, industries, social enterprises, the public sector, and interested student applicants to find HKU experts for contract research, consultancies, and postgraduate student supervision etc. Please visit the HKU Scholars Hub at **http://hub.hku.hk/**.

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