Research Comes to Life: The Power of Translational Research
Research Comes to Life: The Power of Translational Research

Science is a tool for improving the well-being and quality of human life. Besides discovering new theories, nowadays, scientists are keen on taking societal needs into account by applying findings from basic research and translating these complex theories into practice.

In the last issue, we gave an overview on the mission and vision of our Research Divisions – to fully utilise the power of science, it is time for scientists to step out of boundaries and establish close connections with society. In this issue, we will further elaborate on the subject by showcasing a selection of on-going research projects that are translated into practical application and are making an impact on our society.

Message from the Chief Editor

In times of crisis, the wise build bridges. Battling this prolonged pandemic takes wit and strategies. One such tactic requires diligent cooperation among society stakeholders, including academic institutions, industrial corporations, government entities, and the general public.

The Faculty of Science spares no effort in joining hands with corporate partners in bringing solutions against any societal problems. Beyond viral surveillance, diagnosis and treatment, the Faculty also engages in other application-driven projects.

Together with international tech giants and engineering companies, the Faculty has pioneered OLED devices and novel antibiotics with patents acquired and licensed, which enhanced Hong Kong’s translational competency and created a significant impact on society. The Conservation Forensics Lab has been established to collaborate with local and international government agencies to trace illegal wildlife trades. The 6688 Science Master Class, a new double degree programme, is introduced to incubate the next generation of dynamic scientists, who will be trained to translate scientific knowledge into practical application. We hope that these translational approaches would help address a number of pressing societal issues and eventually improve human life.

I hope you enjoy reading this issue as much as I do while learning about all the excitement in the past half-year. Be innovative, be proactive, and be the team player that makes a difference!

Yours sincerely,

Dr Edmund Chun Ming TSE
Chief Editor
Assistant Professor, Department of Chemistry

We need to better equip ourselves through life-long learning, and at the same time be aware of the most up-to-date science and technology development in the world, and to understand the need of the industry.

said Professor Vivian Wing Wah YAM

Contribution to highly emissive OLED display

Professor Chi Ming CHE is a world-recognised expert in phosphorescent metal complexes and the use of long-lived excited states for photocatalysis. His pioneering “one-chelating-ligand+one metal” design strategy has successfully generated various classes of high-performance platinum(II) emitters for OLEDs.

Professor Vivian YAM is a world-recognised expert in molecular design and spectroscopic studies of luminescent metal-based molecular functional materials, particularly in the manipulation and harnessing of excited states for light-enabled technologies and functions. She has pioneered new classes of luminescent metal complexes, especially gold(III) complexes that are photo-stable and capable of displaying long-lived excited states for light-enabled technologies and functions. She has also developed an unprecedented range of gold(III) emissions that are photo-stable and capable of displaying gold(III) phosphors in 1993 has paved the way for the first gold-based OLED in 2005. Subsequent works feature various classes of gold(III) emitters with bidentate, tridentate, and tetradentate ligands with unprecedented high performance and high operational stabilities, together with the generation of Hong Kong-owned intellectual property rights.
Forming partnerships with industries

These innovative works have attracted considerable industrial interests to collaborate with Professor Yam’s team at HKU and to sponsor her work to realise their commercial use in display technology. She has long-term collaboration and strategic partnerships with TCL Corporation Ltd., one of China’s largest enterprises in consumer electronics on the global scale, and its subsidiaries to develop new printable QLED materials and technology. There is an increasing number of display producers joining the QLED market, with market revenue projected to reach more than USD9 billion by 2027.

“The development of our own proprietary luminescent materials that are nationally and Hong Kong-owned is really timely,” said Professor Yam. Currently, most of the commercially available phosphors are based on indium(III) complexes, where foreign companies hold most of the key patents. Our luminescent gold(III) complexes with high originality hold great promises to overcome these business monopolies. Taking advantages of the rich gold reserve in China, being the second largest in the world, the development of luminescent gold(III) complexes can exploit China’s national resources and competitive edge to develop cheaper and high-performance metal phosphors with Hong Kong-owned intellectual property rights.

Working closely with the industry can definitely facilitate more collaborations and motivate more downstream translational activities. This will provide new avenues for the display and solid-state lighting companies in Hong Kong and the Mainland to obtain a fair share of the QLED market. “Our research works in the past are mostly curiosity-driven, but now we are going to do more application-inspired basic research as well as translational research, and hopefully, to enhance Hong Kong’s translational competency and to produce a great impact on the society,” said Professor Yam.

Research Division for Ecology and Biodiversity

Reduction of illegal global wildlife trade through novel conservation forensics research

Hong Kong has long been a central hub in international wildlife trade networks, be it legal or illegal trade. This is due in part to the high volume of trade transactions through its major port, along with its prime location as a transit hub between origin and destination countries. Every year, substantial worth of documented trade passes through Hong Kong’s borders. While much wildlife trade is legal, the quantity of trade provides the opportunity to launder illegally sourced and traded species and products.

The Research Division for Ecology and Biodiversity’s research on wildlife trade has involved decades of multidisciplinary work. Building upon HKU’s history of monitoring illegal trade and the impacts on wild populations, the Conservation Forensics Lab was established in 2016 to investigate the wildlife trade. Having developed a range of molecular and isotopic forensics and data-analysis tools for countering wildlife crime, research undertaken at the Lab has provided data used as evidence to increase enforcement of national and international laws that protect endangered species and support illegal wildlife trade reduction.

Data-based methods for tracing illegal evidence

Multiple laboratory and data-based methods are used to describe patterns, quantify the scale and identify species involved in the trade. By using genetic and biogeochemical approaches, species and their geographic origins can be identified, revealing whether a species is being traded legally or not. Biogeochemical studies could help determine whether an animal was captive-bred or wild-caught, a piece of evidence key to trace whether a species is being sold legally or not. Results from these studies have led to successful prosecutions as well as higher levels of protection for species impacted by trade.

Conservation actions stemming from these research projects have resulted in increased protection of turtles, pangolins, and fish under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and via the International Union for Conservation of Nature (IUCN).

The goal of forensic research is to provide evidence that can be used to aid enforcement and legal efforts to prosecute wildlife-related crimes.

Dr Caroline DINGLE
Director of Conservation Forensics Lab

Newly developed forensics techniques

Looking forward, Director of the Lab Dr Caroline DINGLE expected the newly developed forensics techniques would continue to provide evidence to support successful prosecution.

“We are currently developing methods to apply stable isotope analysis (SIA) to determine whether an animal is captive or wild-caught. SIA has been used widely in ecology, but it is relatively new that this tool is being applied to wildlife forensics. While more work needs to be done to verify that this is a robust forensic tool, it is so far very promising.”

In collaboration with HKU Faculty of Law, the Lab also contributes to the Species Victim Impact Statements (SVIS) Initiative. The aim of this Initiative is to develop statements that provide information on the impacts of wildlife trade on wild populations of species threatened by trade. These statements are made available to the prosecution and judicial teams involved in wildlife crime cases.

“Species mentioned in a case are very critical to the prosecution. In the coming years, the Lab will focus on developing efficient forensic techniques for forensic purposes. In the long run, we aim to make these forensic methods widely available to protect species and individuals.”

“Currently, we are establishing a partnership with the Wildlife Department of Hong Kong to develop a database of reference data for forensic purposes. Through this database, we can provide forensic services to the Department to assist with their investigations.”

Research on the impacts of illegal wildlife trade

Action:
-These studies were influential in contributing to the successful proposal for the up-listing and increased protection of the Chinese pangolins under the CITES and IUCN.
-These studies were influential in contributing to the successful proposal for the up-listing and increased protection of the Chinese pangolins under Appendix II to CITES.

Dr Timothy BONEBRAKE
Professor David DUDGEON

Highlights of successful cases

Dr David BAKER
Action: gathered the first evidence of the illegal trading of European eels into Asia and Hong Kong
Impact: genetically identified glass eels (juveniles of the endangered European eel) intercepted by Hong Kong Customs, leading to a successful prosecution

Dr Timothy BONEBRAKE
Action: conducted a social network analysis of data collected from a range of online sources on Chinese seizures of pangolins
Impact:
- supported the increased protection of pangolins under the CITES and IUCN
- These studies were influential in contributing to the successful proposal for the up-listing and increased protection of the Chinese pangolins from Appendix II to I

Professor David DUDGEON
Action: quantified the illegal turtle trade in markets
Impact: his work was influential in the successful proposal and subsequent increased protection of the big-headed turtle (family Platysternidae) from Appendix II to I

Learn more about the Lab’s research:
- How legal wildlife trades do massive damage to biodiversity
- Endangered species on supermarket shelves
- Species Victim Impact Statement (SVIS) Initiative
  www.cvis.gov.hk/EN

Photo courtesy (wildlife animals) of Astrid ANDERSSON
www.svis.law.hku.hk
https://youtu.be/sUKx6852dfo
https://youtu.be/PSFnStTtF9I
www.svis.law.hku.hk
https://youtu.be/880Q1X2

Video summary for the research:
Species Victim Impact Statement (SVIS) Initiative
www.cvis.gov.hk/EN

- Squirrel monkeys on sale – the legal trade in primates in very lucrative
- Maria will help you to identify and trace species traded in markets
- Painted wood turtle (Rhinoclemmys pulcherrima) is legal, the quantity of trade provides the opportunity to launder illegally sourced and traded species and products
- Yellow-eared Cockatoos (Cacatua sulphurea) for sale in Hong Kong’s bird market

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Dr Caroline DINGLE
Director of Conservation Forensics Lab

Reduction of illegal global wildlife trade through novel conservation forensics research

Hong Kong is the biggest importer and the second largest exporter of traditional medicine globally.

Researchers of Conservation Forensics Lab
(from the left)
Director: Dr Caroline DINGLE
Founding members:
Dr Timothy BONEBRAKE
Dr David BAKER
Professor David DUDGEON

Other member:
Dr Hannah MUMBY

Spotlights

Dr Hannah MUMBY
Professor David DUDGEON
Dr David BAKER
Dr Timothy BONEBRAKE

Founding members:
Dr Caroline DINGLE

We are working closely with industry partners to drive innovation.

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Painted wood turtle (Rhinoclemmys pulcherrima)
Spotlights

Spotlights

Research Division for Mathematical and Statistical Science

Tracing DNA evidence in kinship determination and criminal investigations by user-friendly statistical software

**Researcher:** Professor Tony Wing Kam FUNG, Chair of Statistics

DNA testing is the most powerful tool in parentage and kinship determinations and for mixed stain in criminal investigations. Novel statistical methods and user-friendly software developed by Professor Wing Kam FUNG and his team from the Research Division for Mathematical and Statistical Science, provided a simple means of assessing the weight of DNA evidence. This easy-to-use software built upon sophisticated statistical theory and methodology has been used by forensic and paternity laboratories worldwide in evaluating thousands of cases, with very positive feedback on its analysis of kinship and DNA mixtures.

The developed methodology and software are of fundamental importance in legal contexts: A particularly striking example of the impact of the tool was its success in identifying three badly burned bodies in the Hot-Air Balloon Burt Tragedy in Egypt in 2013, the investigation of which was concluded in the Hong Kong Coroner’s Court in 2016. Fung also solved the DNA mixture problem in the O J Simpson case, a murder case that involved the famous football player which caused a media sensation in the mid-90s.

Translational research would involve considering the societal needs and how efficient and effective the applications can be translated from the complex theory. Whilst a lot of statistical research focuses on methodology, Professor Fung also looks into the applications and tries to apply complex theories to practical problems for societal needs. “The goal of my project is to develop sophisticated statistical methodology and to provide user-friendly software for practitioners such as forensic scientists. More communications would definitely help to cultivate a translational mindset,” Professor Fung said.

Learn more about the software: [https://saasweb.hku.hk/EasyDNA](https://saasweb.hku.hk/EasyDNA)

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Research Division for Physics and Astronomy

A cultural, behavioural, and regulation campaign against light pollution: from Hong Kong to the world

**Researcher:** Dr Jason Chun Shing FUNG, Principal Lecturer

Light pollution is a form of environmental degradation caused by inappropriate or excessive use of artificial outdoor lighting that not only wastes energy, money and valuable earth resources, but also has negative impacts on our ecological systems and possibly our health.

Dr Jason FUNG from the Research Division for Physics and Astronomy and his team underpinned a long-term cultural, behavioural, and regulation movement against light pollution, that combines rigorous scientific research to promote public awareness of the damages caused by light pollution, with the aim of changing public attitudes and behaviors. This movement is particularly aimed at promoting energy-efficient lighting in the Asia-Pacific region.

The appearance of the monitor. The appearance of the monitor. The appearance of the monitor. The appearance of the monitor.

The findings have also helped to identify cost-effective, reliable groundwater resources in Singapore and to reduce the adverse environmental and engineering impacts of land reclamation projects.

As lots of large national-scale projects are happening in China, Professor Jiao has recently been appointed as a member of the Expert Advisory Committee of the Shenzhen Government and offered expert opinions on urban groundwater problems for Shanghai.

The findings have also assisted in identifying suitable coastal sites for reclamation in Sri Lanka and China.

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Research Division for Earth and Planetary Science

Coastal groundwater: its implications for the environment, engineering, and water resources

**Researcher:** Professor Jimmy Jiujiu JIAO

Coastal cities are home to roughly 25% of the world’s population and are rapidly growing. Hence coastal groundwater is vital because of its resource, environmental, and engineering implications. HKU’s Hydrogeology Research Group (HRG), led by Professor JIAO, has researched the impact of land reclamation on groundwater. This work has provided a theoretical framework leading to globally adopted practical guidelines.

The HRG’s findings on offshore groundwater have been used to understand the connection between submarine groundwater discharge (SGD) and red tides, prompting the Hong Kong government to reduce groundwater-induced nutrient sources to better manage the red tide problem.

The findings have also helped to identify cost-effective, reliable groundwater resources in Singapore and to reduce the adverse engineering and environmental impacts of land reclamation in Sri Lanka and China.

These findings and experiences are valuable to other coastal provinces. Professor Jiao has been advising government departments and private organisations in Australia, Bahrain, Philippines, Malaysia and Singapore, to offer consultancy or expert opinions on their coastal land reclamation projects.

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Research Division for Molecular and Cell Biology

Developing a novel therapeutic molecule into an anti-hypertensive drug

**Researcher:** Professor Billy Kwok Chong CHOW, Chair of Endocrinology

Hypertension is known as the silent killer and is the leading preventable cause of premature deaths worldwide. It is clinically shown to dramatically increase the risk of life-threatening diseases such as heart disease, heart attack, stroke, heart failure, peripheral arterial diseases, aortic aneurysms, kidney disease, and vascular dementia, etc. It is estimated that about 1.56 billion people will suffer from hypertension by 2025. Despite the wide range of drugs available for treating hypertension, at least 10% of patients are resistant to all conventional drugs, a condition known as resistant hypertension.

Professor Billy CHOW from the Research Division for Molecular and Cell Biology, has founded a start-up company PhrmaSec Ltd. HK, focusing on the discovery of novel therapeutic molecules for the treatment of major critical diseases. Using G Protein-Coupled Receptors (GPCRs) as targets, his team was able to discover a small molecule allosteric modulator of the Human secretin receptor, developing the novel small molecule “KSD170919” into an anti-hypertensive drug to address the continually expanding hypertensive population.

As the KSD170919 discovered by Professor Chow’s laboratory targets a new mechanism, it has the potential to be used for the therapeutic treatment of patients resistant to conventional drugs. The main advantage of this drug is that it is inexpensive to synthesise, it is safe since it possesses minimal acute and chronic toxicity according to OECD guidelines, and it significantly lowers blood pressure for a much longer 60-hour window in the hypertensive rat model. With this scientific advancement, the start-up has filed a patent and obtained an exclusive license from HKU to develop and market this drug.

Professor Chow said there is no other time like today for researchers to be more responsible than ever to bring their innovation to the public. “If you are in basic biology research, then it is your utmost responsibility to translate your novel innovation for the betterment and health gain of the society that you live in,” he remarked. “I find beauty in science. The real essence of science is to find a way to mould and translate them into something extraordinary to face the problems in the world.”

Researcher: Professor Billy Kwok Chong CHOW, Chair of Endocrinology

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A bilingual website was set up by the team to educate the public on light pollution: [http://nightsky.physics.hku.hk](http://nightsky.physics.hku.hk)

"Fossil time machine" reveals the historical range and diversity of corals in the Greater Bay Area for the last 5,000 years

By PhD graduate Dr Nathan CYBULSKI

As corals grow naturally, pieces of them will break off and fall to seafloor becoming a part of the sediment. Over time, many different layers of these coral skeletons will stack on top of one another. The Research team from The Swire Institute of Marine Science cored through these sediments and collected coral skeletons that dated back over 5,000 years ago. Their goal was to investigate the historical presence of coral communities in the Greater Bay Area. The team created a sort of fossil “time machine”, and generated the first paleoecological baseline for coral communities in the area.

One of the aims of this project was to better understand what it may have taken to save Hong Kong corals. Results have already played a critical role in protecting and restoring corals locally by assisting a coral restoration project in Hoi Ha Wan Marine Park, which was pioneered by another research team from the same affiliation. Corals such as Acropora which previously thrived in Hoi Ha before human activities decreased their numbers, are being returned to their proper home.

To date, over 95% of the reintroduced coral have survived. Corals such as Acropora that previously thrived in Hoi Ha before human which was pioneered by another research team from the same affiliation. Results have already played a critical role in protecting and restoring corals locally by assisting a coral restoration project in Hoi Ha Wan Marine Park, which was pioneered by another research team from the same affiliation. Corals such as Acropora which previously thrived in Hoi Ha before human activities decreased their numbers, are being returned to their proper home.

Fossil time machine: An illustration of corals growing on a coral reef, with some pieces breaking off and falling to the seafloor, becoming part of the sediment.

Photo courtesy of Jonathan CYBULSKI

Dietetics research identified low GI diet as a potential Type 2 diabetes prevention strategy

By Assistant Professor Dr Jimmy Chun Yu LOUIE

A research team from the Research Division for Molecular and Cell Biology, identified low GI (Glycemic Index) diet as a potential Type 2 diabetes prevention strategy. The team performed a research comparing the overall fluctuations in blood glucose levels of a high GI diet and a low GI diet, and is the first to provide research of the same type. The team found that following the low GI diet, the overall fluctuations in blood glucose levels during the day was 15% lower than that of following the high GI diet.

A laboratory study showed that participants in a 16-day trial who consumed a low GI diet (high fiber and low glycemic-index carbohydrates) saw a 15% reduction in blood glucose levels during the day, compared to those consuming a high GI diet.

Research team: Hong Kong

Learn more:
https://bit.ly/33TLmC7

A photo of the key members of the research team. From the left: Dr Jimmy LOUIE, student researcher Miss Hannah Wing Han HON and graduate researcher Dr Tommy WONG.

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Fossil time machine: An illustration of corals growing on a coral reef, with some pieces breaking off and falling to the seafloor, becoming part of the sediment.

Photo courtesy of Jonathan CYBULSKI

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**An anti-theurmic gold drug could resuscitate “last-resort” antibiotics to kill multi-drug-resistant superbugs**

By Professor Hongzhe SUN, Acting Director of Research Division for Chemistry & Norman and Cecilia Yip Professor in Bioinorganic Chemistry; Dr Pak-Leung HO, Director of the HKU Carol Yu Centre for Infection from the Department of Microbiology, Li Ka Shing Faculty of Medicine

Antibiotic resistance occurs when bacteria adjust to the misuse or overdose of medicines, and it has become one of the biggest public health challenges in this era. A research team from Chemistry, in collaboration with the Department of Microbiology, Li Ka Shing Faculty of Medicine, discovered that by repurposing an anti-theurmic gold(0) drug, auranofin, “last-resort” antibiotics, viz. carbapenem and colistin can be reinvigorated for the treatment of infections caused by multidrug-resistant superbugs including bloodstream infections, pneumonia and wound infections. The findings provide insights into the development of inorganic pharmacuetics and new therapeutic approach for superbug infections.

**Untangling the puzzle of Nobel Prize-winning theory**

Kosterlitz-Thouless (KT) phase

By Associate Professor Dr Ziyang MENG from the Research Division for Physics and Astronomy

Kosterlitz-Thouless (KT) phase is a quantum critical state that emerges in the thermodynamic limit of two-dimensional systems. It describes a transition from long-range ordered states to disordered states at finite temperature and is characterized by the vanishing of the correlation length. KT phase has applications in various areas, but it is generally difficult to solve these mathematical models because of their complicated structures and very high dimensionality.

A particular problem is the bilinear optimal control of an advection-reaction-diffusion system, where the control variable is the velocity field in the advection term. This problem was proposed in 1990s by late Professor J L Lions (1928–2001), who was a world-leading mathematician and widely regarded as the founder of the area of optimal control of PDEs. It has broad important applications in areas such as bioremediation, environmental remediation process, and mixing enhancement of different fluids, while there were very few progresses on this problem from either mathematical or computational perspective. Recently, Professor Xiaoming YUAN and his students from Research Division for Mathematical and Statistical Science collaborated with Professor Roland GLOWINSKI from University of Houston, who is a worldwide renowned applied Mathematician and a former student of Lions, on this challenging problem. For the first time, they proved the existence of optimal controls and derived the first-order optimality conditions in the general setting, and they proposed an efficient and easily implementable numerical algorithm.

The paper is available on https://arxiv.org/abs/2101.02629

**Physics and Astronomy**

**Mathematical and Statistical Science**

**Bilinear optimal control of an advection-reaction-diffusion system**

By Professor Xiaoming YUAN

Optimal control problems, constrained by partial differential equations (PDEs) capture important applications in various areas, but it is generally difficult to solve these mathematical models because of their complicated structures and very high dimensionality. A particular problem is the bilinear optimal control of an advection-reaction-diffusion system, where the control variable is the velocity field in the advection term. This problem was proposed in 1990s by late Professor J L Lions (1928–2001), who was a world-leading mathematician and widely regarded as the founder of the area of optimal control of PDEs. It has broad important applications in areas such as bioremediation, environmental remediation process, and mixing enhancement of different fluids, while there were very few progresses on this problem from either mathematical or computational perspective. Recently, Professor Xiaoming YUAN and his students from Research Division for Mathematical and Statistical Science collaborated with Professor Roland GLOWINSKI from University of Houston, who is a worldwide renowned applied Mathematician and a former student of Lions, on this challenging problem. For the first time, they proved the existence of optimal controls and derived the first-order optimality conditions in the general setting, and they proposed an efficient and easily implementable numerical algorithm.

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**New Staff**

**Chemistry**

**Physics and Astronomy**

**Mathematical and Statistical Science**
Aiming to fly higher to achieve global excellence

Professor Juha MERILÄ
Director of Research Division for Ecology and Biodiversity
Chair Professor of School of Biological Sciences

- 2020 Received Danish National Research Foundation Chair grant (~HK$12M)
- 2017, 2008–2011 Academy Professor (Distinguished Professor) of Academy of Finland
- 2012 Brahí Forum Professor of Institute of Zoology, Chinese Academy of Sciences
- 2005 Elected to Finnish Academy of Science and Letters

Ecology examines life, while biodiversity is essential for sustaining it. HKU Research Division for Ecology and Biodiversity (DEB) is well-positioned to continue advances in both of the above areas, by bringing new approaches and novel techniques to standing ecological and evolutionary questions that play an important role in the conservation and management of endangered species globally.

DEB oversees a range of projects on fundamental research in ecology and evolution, as well as applied work on environmental change, which needs a leader who masters in both academic and applied research to take the Division to the next level. As an evolutionary biologist, Professor Juha MERILÄ best suits his role as the Director of the Division, for he has a long history of revolving around problems related to animal adaptation of new and changing environmental landscapes, as well as finding ways to surmount the challenges.

Being a long-term academic researcher, as well as a practitioner of applied research, Professor Merilä focuses on conservation of biodiversity, fishery management and also, organismal adaptation to climate change — he has come on board just in time to bring out the best in the Division.

His early years were spent in a naval base with access to a beautiful archipelago, at some point, he picked up bird watching as a hobby, which is where his interest in animal ecology stems from. The backbone of his academic research focuses on fundamental science but he has made frequent diversions on the more applied side: “I do hope that at least some of my academic research focuses on fundamental science but he has made frequent diversions on the more applied side, ‘I do hope that at least some of my research will make contributions to change the world for better, and if notdirectly, then by inspiring others to pick up topics to study which do make differences,’ he said.

DEB is a very international working environment in terms of the members’ diverse cultural and educational backgrounds. One very active area of research in the Division involves studies on various effects and consequences of climate change on organisms, populations and ecosystems. The Division is also very strong in the realms of marine and conservation biology, including restoration of degraded ecosystems and wildlife trade.

As to the latter, researchers at the Division have provided technical expertise and support to local and international agencies to enhance their ability to detect, enforce and prosecute illegal wildlife trade. “For example, the research has allowed increased enforcement of national and international law protecting endangered species and supported illegal wildlife trade reduction. As Hong Kong is a global hub for wildlife crime, the research has led to significant reductions in illegal trade,” said Professor Merilä. Besides, evolutionary biology research is also one of the strengths of the Division, many of the recent hires at DEB have their research related to evolutionary biology research focusing on genetic underpinnings of organismal responses to climate change and evolutionary genetics of wild populations in general.

The quality of research in the DEB is already very high, and many cross-disciplinary collaborations are already in place. As the Director of the Division, he will improve these high standards and strengthen them with new hires, new grants and whatever measures he can think of. “I also see my role as a facilitator and mentor for the entire Division: a person who should flatten the road for others — shield them from anything that takes their time and focus away from conducting cutting edge research,” he added. Therefore, he has set out a longer-term vision for DEB — positioning as one of the world’s leading biodiversity research centres. With this ambitious plan and relentless commitment of our researchers, hopefully it will not take long for DEB to fly and soar to new heights again.

The Faculty of Science is introducing a new double degree programme, the 6688 Science Master Class in academic year 2021-22, allowing talented students to complete 2 degrees – a Bachelor of Science (BSc) and a Master of Research (MRes) from HKU in a fast track. This elite programme caters specifically to the needs of science-inclined students, with Science Masters (renowned scientists in the Faculty) helping students achieve their scholastic potential in science.

One of the best ways to learn is to be inspired from those who excel. This programme allows research-aspired students to immerse themselves in an authentic research environment and learn from researchers from diverse backgrounds, incubating the next generation of dynamic scientists who are able to translate scientific knowledge into practical applications with far- and wide-reaching impacts.

What the programme covers

Fast-track for completing 2 degrees

Catering the needs of elite students

Research-oriented

Science Master Class

Learn from the Best Minds  Be Inspired by our Science Masters

The programme introduction: https://bit.ly/3eQ409n

Revisiting the admissions talk: https://bit.ly/3eYm3Am

Academic programmes and special resources are open to students in the 6688 Science Master Class Programme. Students in the programme should be academically ambitious and capable of doing well.

Remarks: Students in the programme have to maintain a high CGPA in order to remain in this programme. Academic performance is assessed on a 4-point scale, with GPA ranging from 1.0 to 4.0. The minimum GPA required to remain in the programme is 3.0. Students who do not meet the minimum GPA requirement will be offered the option to re-enter the programme with a CGPA of 3.0 or higher, or they will be required to withdraw from the programme.

Science begins by asking questions and then seeking answers, yet mastering questioning skills is never an easy task. “This is something that one cannot learn from reference texts and books,” Professor Alice Wong, Associate Dean of Science (Teaching & Learning) remarked. “I have been teaching at HKU for years, and I found that there are many outstanding students in Hong Kong who have a passion for doing research. All they need is an opportunity to be cultivated in an early stage. The Science Masters will be able to share their experiences, their attitude, their way of looking at things and approaching a problem, their determination to solve a problem and to strive for excellence, as well as their vision in Science, and it is going to be a very inspiring journey.”

https://bit.ly/3eYm3Am

Visit the website: https://bit.ly/3eYm3Am

New academic programme features

- Grand Masters through special tutorials
- Masters as academic advisers
- Discipline-based intensive study for research-aspiring students
- Research-oriented research postgraduate courses and research projects to enhance the students’ frontier scientific knowledge and research skills

Teaching
Get to know
Our Grandmasters

What makes a Scientist?
Hear what our Science Masters say!

Awards and achievements
- Member of the Chinese Academy of Sciences
- Foreign Member of Academia Europaea
- Fellow of The World Academy of Sciences (TWAS)
- Founding Member of the Hong Kong Academy of Sciences
- Member of the American Physical Society

With a young mind you should start
to develop your sense about scientific research in an early stage.

Professor Chi Ming CHE
Zhou Guangzhao Professor in Natural Sciences
Head and Chair Professor of Chemistry
Professor Che has made inspiring contributions in inorganic chemistry, medicinal chemistry and photochemistry. His pioneering study on synthetic chemistry shapes the culture of local research community.

What you will learn

- Recipient of numerous awards in international academic arena including Foreign Associate of the US National Academy of Sciences
- Founding Member of the Hong Kong Academy of Sciences
- The first Hongkonger to receive a First-class Prize of the State Natural Science Award
- Member of the Chinese Academy of Sciences
- Foreign Associate of the US National Academy of Sciences

Awards and achievements
- Recipient of the Croucher Foundation Senior Research Fellowship
- Recipient of The Porter Medal 2020
- Member of the Chinese Academy of Sciences
- Fellow of The World Academy of Sciences (TWAS)
- Foreign Member of Academia Europaea
- Founding Member of the Hong Kong Academy of Sciences
- Chair Professor of Chemistry

It will be a very inspiring journey, in which students will be learning to ask a great question that leads to the answer.

Professor Alice Sze Tsai WONG
Associate Dean of Science (Teaching & Learning)
Programme Director of 6688 Science Master Class
Professor WONG is a knowledgeable biologist who leads a team of scientists studying cell adhesion and signal transduction in cancer. Her work provides important insights into the nature of ovarian carcinogenesis and informs the best practices of identifying new targets in cancer diagnosis and therapy.

Awards and achievements
- Recipient of the Croucher Foundation Senior Research Fellowship
- Laureate of L’Oreal-UNESCO For Women in Science Award
- The Porter Medal 2020
- Member of the Chinese Academy of Sciences
- Founding Member of the Hong Kong Academy of Sciences
- Member of the American Physical Society

We should have the ability to attack the same problem over and over again, from different angles or perspectives.

Professor Michael NG
Director of Research Division for Mathematical and Statistical Science
Chair Professor of Mathematics
Professor Ng’s research interests lie in artificial intelligence, data science and scientific computing, which are crucial for shaping the future of human life. Setting his vision far and wide, he is the pilot for the development of research in Mathematical and Statistical Science in the Faculty.

Awards and achievements
- Recipient of the Feng Kang Prize of Scientific Computing
- Fellow of the American Mathematical Society
- Member of the Hong Kong Academy of Sciences
- Member of the Chinese Academy of Sciences
- Foreign Associate of the US National Academy of Sciences

“I will take my students to laboratory and let them feel how I apply and elaborate Science. I want them to see what it is like to be a researcher in real life because nothing compares to first-hand experience.”

Professor Vivian Wing Wah YAM
Philip Wong Wilson Wong Professor in Chemistry and Energy
Chair Professor of Chemistry
Professor YAM is a world-recognized expert in the molecular design and spectroscopic studies of luminescent molecular functional materials, particularly in the manipulation and harnessing of excited states for light-enabled technologies and functions.

Awards and achievements
- Laureate of L’OREAL-UNESCO For Women in Science Award
- The Porter Medal 2020
- Member of the Chinese Academy of Sciences
- Foreign Associate of the US National Academy of Sciences
- Fellow of The World Academy of Sciences (TWAS)
- Foreign Member of Academia Europaea
- Founding Member of the Hong Kong Academy of Sciences
- Chair Professor of Chemistry

Exposure to scientific research in the early stage of university years will allow insight into more difficult frontiers of modern science and help one to determine an area of interest.

Professor Wang YAO
Chair Professor of Physics
Professor Yao is a condensed matter physicist. His current research interest lies in 2D materials, and has played a decisive role in creating an important new research direction – valley optoelectronics, which aims to exploit valley, a quantum degree of freedom of electron, in future optoelectronic devices.

Awards and achievements
- Fellow of the American Physical Society
- Founding Member of the Hong Kong Young Academy of Sciences
- Named by Clarivate Analytics in the list of “Highly Cited Researchers” among the world’s eminent researchers in 2018-2020

“A good scientist should have a questioning attitude to any ideas and hypothesis.”

Professor Guochun ZHAO
Chair Professor of Earth Sciences
Professor Zhao has a clear mind in the face of challenges on his research of metamorphic petrology, precambrian geology and supercontinents. His perseverance makes him the holder of many prestigious honours.

Awards and achievements
- Member of the Chinese Academy of Sciences
- Recipient of the National Natural Science Award (First-class)
- Recipient of the State Natural Science Award (Second-class)
- Fellow of The World Academy of Sciences (TWAS)
- Name by Clarivate Analytics as “Highly Cited Researcher”
Curing the incurable:
One startup’s mission to help one million

For most of us, the new year brought about new resolutions that we can hopefully achieve by the end of the year, but for Harrison LI, a fresh BSc graduate of Food and Nutritional Science, there is an ambitious goal on the horizon: eliminate eczema for one million people by 2026.

Having embarked on this mission since 2013, Harrison founded WeDerm a year ago as part of The Eczema Eradication Project. WeDerm is an award-winning social enterprise aimed at addressing the medical gap for eczema treatment to help those suffering from this chronic autoimmune disease.

Harrison himself has been through his own share of struggles in trying every conventional and unconventional way, but to no avail. The typical treatment for eczema has been steroid cream, which only serves as a temporary fix, leading to a vicious cycle of increasing drug intensity and reliance. It was not until ten years later, when he discovered the potentials of an integrated strategy involving nutrition and lifestyle in the management of eczema. Eager to share his first-hand experience and newfound knowledge, he created a website and authored a book to provide a one-stop information base for other eczema sufferers. It led him to his current work at WeDerm, which aims to establish a peer community for support amongst eczema sufferers. Its treatment plan involves one-to-one coaching with health professionals and workshops where people of similar experiences get to meet and learn from one another. Since its founding, WeDerm has helped over a hundred people through their pilot workshops.

Mr Simba Xiang ZOU, a second-year BSc student majoring in Physics, Intensive, has been fascinated by the discipline since his childhood. From fundamental building blocks of the universe to the magnificent gigantic stars and immense galaxies, Simba was attracted by this age-old subject that dates back to the times of ancient Greece. This explains his strong interest and motivation to study physics at university.

After being accepted by the Faculty’s Summer Research Fellowship (SRF) Scheme, which supports science undergraduate students to conduct research under the supervision of an academic, Simba was assigned to work at the Laboratory for Space Research (LSR) in Cyberport last summer. Here he spent over two months working on a topic related to planetary nebulae, the glowing ghostly relics of dying stars. During the period, he was given access to a globally significant and unique database called “HASH” (Hong Kong AAO Strasbourg H-alpha) a Planetary nebula research platform that contains sets of multi-wavelength imaging data and optical spectroscopy of all known Galactic PN, and his job was to perform manual checking on the reliability of some specific subset of those data for PN with identified central stars.

During the Summer Research Fellowship, Simba was surrounded by experts who gave him real learning experiences. It took Simba a while to get into the research mode, comprehend jargons, acquaint and master the necessary research skills, but soon he managed to find a way to catch up.

The fantastic scenery outside LSR for physics student

Most helpful of all is that he found himself, unsurprisingly learning a lot from the astronomy experts. While working on the data analysis of planetary nebulae, Simba was supervised by the Director of LSR and expert in the field Professor Quentin PARKER, who greatly improved his efficiency in working out the project, and many other experienced researchers were there to offer their helping hands. “It was like entering a marvelous academic community!” Simba said.

During his summer fellowship, he assisted Professor Parker in correcting the central star coordinates of a list of planetary nebula published in other journal papers, of which he conducted a large portion of data analysis. He also analysed two newly established planetary nebulae catalogues, where some interesting conclusions about the aforementioned errors spotted are drawn. His research findings will form the basis of a future refereed journal paper where he will be a co-author.

Facing up real obstacles
Simba believes that the SRF scheme does not only provide a valuable opportunity for enthusiastic students to have an early taste in conducting research, but it also equips them with the ability to self-study, that he believes plays a key role in pursuing a research career.

“For a year-two student, it is hard for me to start a research topic of my own due to limited disciplinary knowledge. However, the SRF scheme inspires me to learn more about astronomy, astrophysics and quantum physics, which I believe will be able to find my research path very soon. It is also great to explore my research interest and possible topics, which may in turn affect my future career. I believe I will be able to find my research path very soon. It is also great to explore my research interest and possible topics, which may in turn affect my future career.”

Mobile app for tracking eczema
Forecasting the current situation is likely to drag on for the rest of 2021, therefore, by September 2020, Harrison and his team had already invested part of their budget, and hours to research all of the eczema mobile applications worldwide, and designed Hong Kong’s 1st mobile symptom tracker for eczema, EczeTrack. EczeTrack was designed to help the user track daily habits like a diary, and to coach them by recording clinical outcomes like change in symptom severity and quality of life. The app is currently still in an early stage of development, and the team is trying to create a better user experience. As telemedicine is an integral part of the future of healthcare and the impact of technology is already happening, Harrison said WeDerm must go on, and it will operate in hybrid, because human touch is irreplaceable.

When asked to dish out advice for those aspiring to run a start-up social enterprise, one crucial takeaway from the WeDerm founder is to know why you’re doing it. Harrison recommends joining competitions as a great way tohammer out your idea into something concrete and practical. Recognising the popularity of such case competitions for their excitement and embodiment on recognising the severity of the eczema problem, he emphasises that, “If you really want to start something, know why you’re doing it.” Once you have that drive to create change, case competitions become more than just winning a trophy.

The fantastic scenery outside LSR for physics student
A research team led by Professor Alice See Tai WONG from the Research Division for Molecular and Cell Biology, including her collaborators Dr Shanshan LI, Dr Ka Man IP, Dr Kei Shuen TANG and Professor Ho Cheung SHUM, received a Silver Medal at the Special Edition 2021 Inventions Geneva Evaluation Days hosted by The International Exhibition of Inventions Geneva (IEIG). The team developed a microfluidic tool that captures metastatic cancer cells, which can differentiate metastatic and non-metastatic cells by biochemical and biophysical characteristics of individual cells, aiming for diagnostic and drug screening purposes. It works best with ovarian cancer, colorectal, gastric and prostate cancers.

A research conducted by Professor Jian WANG from the Research Division for Physics and Astronomy and his collaborators, has been selected as one of the 50 Milestone papers in the last 50 years of Physical Review B, a top physics journal published by the American Physical Society. The paper published in 2001 focused on the determination of ballistic conductance through device interfaces. Link to the research: https://bit.ly/3s3BxuO

Professor Guochun ZHAO, Chair Professor of Department of Earth Sciences, was elected as a Fellow of The World Academy of Sciences (TWAS) in recognition of his outstanding contributions to earth sciences and science promotion in developing countries.

Professor Guosheng YIN, Research Fellow of Research Division for Earth & Marine Sciences, elected a Fellow of the Institute of Mathematical Statistics (IMS) in 2021.

Dr Ho Yu AU-YEUNG, Associate Professor from Department of Chemistry, Dr Timothy BONEBRAKE, Deputy Director and Associate Professor of School of Biological Sciences and Dr Ryan MCKENZIE, Assistant Professor from Department of Earth Sciences were awarded the University Outstanding Young Researcher Award 2020 for their contributions to curriculum development, mentorship, teaching and learning within and outside the discipline.

Professor David DUDGEON, Emeritus Professor from School of Biological Sciences was awarded the University Outstanding Research Student Supervisor Award 2020 for his excellent guidance in helping his students in the pursuit of research excellence.

Dr Louise ASHTON, Assistant Professor from School of Biological Sciences was awarded Faculty's Research Output Prize 2019-20 for honouring her exceptional work in the research project “Termites mitigate the effects of drought in tropical rainforest”, Science, 2019, Vol. 363, Issue 6423, pp. 174–177.

The University Knowledge Exchange Excellence Award 2020 went to a team of ecologists from Conservation Forensics Laboratory and the School of Biological Sciences including Senior Lecturer Dr Caroline DINGLE, Associate Professor Dr David BAKER, Deputy Director and Associate Professor Dr Timothy BONEBRAKE and Emeritus Professor David DUDGEON in recognition of their outstanding accomplishments in their Ki project entitled “Reduction of Illegal Global Wildlife Trade through Novel Conservation Forensics Research.”

A team of physicists, engineers and chemists from across local institutions, led by Chair Professor Wang YAO of Research Division for Physics & Astronomy, working on the research of fundamentals and emerging technologies of two-dimensional (2D) materials, was awarded a funding of over HK$80 million from the Areas of Excellence (AoE) Scheme 2020/21 (Ninth Round) under the University Grants Committee (UGC). This will facilitate the exploration of fundamental physics in the new realm of two-dimensional atomic crystals and their van der Waals heterostructures with the abundant quantum degrees of freedom (e.g. spin, valley); and to explore quantum engineering of materials and devices in the 2D-represented atomically thin 2D geometries, with the aim to revolutionise electronics, optoelectronics and photonics.

Another AoE project that HKU physicist takes part in is a cross-institutional one on metamaterials and meta-devices led by The Polytechnic University of Hong Kong. Professor Shuang ZHANG of the Research Division for Physics & Astronomy is one of the Co-Investigator of this successful grant application.

According to the QS World University Rankings by Subject 2021, HKU continues to excel in a wide array of science disciplines. The rankings symbolise the relentless effort of all Faculty members, and we will not be complacent but devote to achieve teaching and research excellence, creating knowledge and impacts.

Ranking summary:
Biological Sciences: #75
Chemistry: #82
Earth & Marine Sciences: #49
Environmental Sciences: #44
Geology: #50
Life Sciences & Medicine: #55
Materials Science: #61
Mathematics: #53
Natural Sciences: #52
Physics & Astronomy: #66
Statistics & Operational Research: #48

Read more: https://bit.ly/3wR7MRA

The University of Hong Kong (HKU) joins hands with the Institute of Oceanology of the Chinese Academy of Sciences (IOCAS) to establish the Joint Laboratory of Marine Ecology and Environmental Sciences (JLMEES), fostering collaboration in the fields of marine and environmental sciences between HKong and Mainland China, and to build a sustainable marine environment. The two institutes signed the Memorandum of Understanding (MoU) on November 24, 2020.

Read more: https://bit.ly/3wr7MRA

~ Obituary ~
It is with deep sadness that we mourn for the passing away of Doctor of Sciences and Emeritus Professor Brian MORTON on March 28, 2021. In his sleep, at the age of 78. We honour the memory of Professor Morton in many aspects, be it his relentless commitment in founding the Swine Marine Laboratory (later renamed as Swine Institute of Marine Science) three decades ago, or his significant contributions in teaching and research in marine biology as well as in pioneering the marine environmental conservation in Hong Kong.

The full obituary of Professor Morton can be viewed at: https://bit.ly/3eL109V
Information Session for DSE Students –

Your First Lecture

@ HKU Science

Date: May 27, 2021 (Thursday)
Time: 12nn – 5:45pm

Programmes:
• Pre-induction talks on 6901 BSc, 6688 Science Master Class, 6729 BSc(ActuarSc), 6224 BASc(AppliedAI)
• Mock lectures by HKU Science academics

Target audience: HKDSE students who are interested in pursuing Science at HKU

Details:

What is the university life at HKU like?
Join us at our pre-induction talks and mock lectures in diverse science disciplines.
Get a taste of being a HKUer with us!

Mock lecture schedule

<table>
<thead>
<tr>
<th>Time</th>
<th>Talk 1</th>
<th>Talk 2</th>
</tr>
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<tbody>
<tr>
<td>12:00–12:45pm</td>
<td>6901 BSc + YSS pre-induction talk</td>
<td>6224 BASc(AppliedAI) pre-induction talk</td>
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<tr>
<td>1:00–1:45pm</td>
<td>6688 Science Master Class pre-induction talk</td>
<td>6729 BSc(ActuarSc) pre-induction talk</td>
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<tr>
<td>2:00–2:45pm</td>
<td>Mock lecture on Biological Sciences</td>
<td>Mock lecture on Physics</td>
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<tr>
<td>3:00–3:45pm</td>
<td>Mock lecture on Mathematics</td>
<td>Mock lecture on Chemistry</td>
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<tr>
<td>4:00–4:45pm</td>
<td>Mock lecture on Statistics &amp; Actuarial Science</td>
<td>Mock lecture on Earth Sciences</td>
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<tr>
<td>5:00–5:45pm</td>
<td>Mock lecture on Environmental Science</td>
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Mock lectures at a glance

<table>
<thead>
<tr>
<th>Theme</th>
<th>Topic</th>
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<tr>
<td>Biological Sciences</td>
<td>Animal Behaviour</td>
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<tr>
<td>Chemistry</td>
<td>Go with the Electron Flow</td>
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<tr>
<td>Earth Sciences</td>
<td>Interesting Facts about Our Earth</td>
</tr>
<tr>
<td>Environmental Science</td>
<td>Emerging environmental challenges: noise and light pollution</td>
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<tr>
<td>Mathematics</td>
<td>Counting to Infinity</td>
</tr>
<tr>
<td>Physics</td>
<td>Nuclear Binding Energy and Nuclear Power</td>
</tr>
<tr>
<td>Statistics &amp; Actuarial Science</td>
<td>Introduction to Statistical Learning</td>
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Alumni Corner

New Cabinet of HKUSAA
The HK Science Alumni Association (HKUSAA) has formed a new cabinet of executive committee for 2020/2021 in September 2020, at which Ms Kelly NGAN was elected the President. Former President John LEE continues his support by serving as Honorary Treasurer; Caroline CHAN and Tom CHAN as Honorary Secretary and Vice-President respectively, while Dr Raymond CHEUNG, Daniel CHOK, Peter MAK, Samuel NGAN and Roxane YEUNG would serve as executive members.

Eyecare ZOOM Workshop
The pandemic cannot stop us from uniting with each other. HKUSAA has formulated a year-plan with a series of activities to stay connected with members. Joining hands with Orbis, the Association hosted an Eyecare ZOOM Workshop to introduce common visual problems. Not only tips on daily eye care were available in the workshop, this virtual gathering also brought our alumni together to reforge connections.

Learn more about the activities and online workshops of HKUSAA at its Facebook page:

Facebook: HKUSAA

Acknowledgements
We would like to express gratitude to our donors for their recent support, which is paramount for us to grow and scale new heights (in alphabetical order).

Individual donors
Ms Winnie Oi Yee CHAN
Mr Wing Wah CHAN
Mrs Chun Wah CHAN SO
Professor Chi Ming CHE
Professor David Lee PHILLIPS
Mr Zhouyuan ZHONG

Corporate donors
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