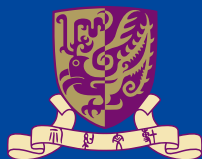




務本·立標·育成
Basics, Benchmarks, Benefits

中大研與學 CUHK RESEARCH



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序言



2013年，香港中文大學慶祝五十周年校慶。歐洲許多大學在中古時期已經建立，歷史悠久；與之相比，五十年只是一眨眼的光景。可是，中大的首五十年，正值知識大量增長、資訊快速傳播的時期，全球人類學習速度之快，前所未有。在這短短的時間內，我們的研究工作已在高等教育界取得令人注目的成果，實在值得高興和欣慰。這些成就，全賴中大歷代學者與學生的智慧與努力，以及政府和機構與個人捐助的支持。香港位處中西交匯點，經歷傳統與現代，這獨有的特點也提供有利環境，刺激思想的成長。

中大在1963年建校，未幾即展開學術研究工作，並訂明目標，成為一所教學與研究並重的綜合型學府。成立初期，大學已充分運用資源，配置設施和人員，致力科學與人文研究；而這些早期先鋒的研究成果，又吸引更多有國際地位的研究人員加入中大的行列。大部分學者都會同意，只要人才薈萃，加上政策和資源分配方面的支持，研究工作便會開花結果。這種研究文化，在早期的中大就已經扎根。

本書在中大金禧之際出版，刊載了中大研究工作中一些最知名的成功例子，並介紹成績斐然的學者。書中所選的研究項目，不僅學術成就傑出，表現創新，更重要的是，在人類發展的進程和社會層面上有重大意義。中大本身的研究項目在本地、國家和國際層面受到表揚，而中大與國家組織和重要國際研究機構的合作項目，也提升了中大在全球研究機構中的地位。

學術研究並無止境。本書縷述的成果固然值得自豪，但中大全人深信我們至今的成就，只是提供了基礎，讓後人進一步研究、開拓與創造，追求更劃時代的發現。我們相信科學會繼續發展進步，我們致力尋求知識、發掘真理；這些信念，會持續推動我們以更大的熱誠、更充沛的魄力從事研究工作。在邁向新領域的過程中，研究工作仍然是維持中大穩固步伐的基石。

張妙清教授
副校長(研究)

FOREWORD

The Chinese University of Hong Kong celebrates its fiftieth anniversary in 2013. While 50 years is just an eye's blink when measured against the history of many European universities with medieval foundations, our first 50 years occurred in an age in which the phenomenal growth in knowledge, the rapid transmission of information, and the global spread of learning have taken place at a speed that has never been witnessed before in human history. We are glad and grateful that our research has achieved much worthy of note and mention in the realm of higher learning within this compact but exciting timeframe. Such achievement is the result of the genius and diligence of successive generations of academics and students in the University, the support of the government as well as institutional and individual funders. In particular, the unique position of Hong Kong, situated at the convergence of East and West, as well as the traditional and the modern, has provided for a milieu that stimulates intellectual growth.

Academic research began at the Chinese University as soon as the University came into being in 1963. The fledgling institution aimed to become a comprehensive seat of learning with dual emphasis on teaching and research. Right from the onset, research facilities and personnel in both the sciences and the humanities were put in place as much as resources would allow, and the first fruits of these early pioneers soon attracted more researchers of international standing to join the ranks of the academics here. As most academics would agree, research blooms where fine scholars congregate, and where encouragement exists in terms of both policy and resource allotment. This research culture has taken root at the Chinese University since its early days.

This volume, published on the occasion of the Golden Jubilee of the University, features samples of the best known success stories in CUHK research, and the

scholars credited for their achievements. The research projects described in the ensuing pages have been selected not only for their academic merit and innovation but, more importantly, for their significance in the greater context of human progress and social relevance. In addition to CUHK research projects that have won local, national and international accolades, our standing in the global community of researchers has been much enhanced by joint ventures and other forms of collaborative efforts with national agencies and leading research institutions worldwide.

There is certainly no *ne plus ultra* in academic research. We at The Chinese University of Hong Kong are fully convinced that our achievement thus far, presented here with joy and pride, provides only the foundation for further discoveries, greater inventions, and more cutting-edge revelations that will transpire in the days to come. Our faith in scientific progress, and our commitment to truth via knowledge, will urge us on to pursue our research with redoubled zeal and vigour. Research remains the bedrock to which CUHK is anchored as we stride towards new frontiers.

Prof. Fanny M.C. Cheung

Pro-Vice-Chancellor (Research)

務

THE BASICS

本

德裔美國火箭科學家Werner von Braun (1912-77)曾說：「基礎研究就是那些連我自己都不知道在做甚麼，而我卻又正在做的研究。」

基礎研究有時候不只外行人困惑，連科學家自己也可能說不出個所以然來，因為這類研究通常要解答基礎的問題，如生命的奧秘、宇宙的起源，或者為何「數字主宰萬物的變遷」(借用羅素的話)。

1990年，香港首次以「胚胎冷藏／解凍」技術成孕的嬰兒(雙胞胎)誕生，這是中大醫學研究人員在胚胎保存和植入研究取得的成果。中大研究人員至今還在努力破解生命之謎，陳小章教授研究上皮細胞離子通道對於不育的影響就是一例。

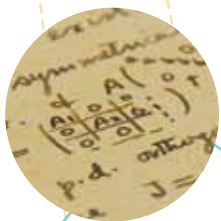
植物生命同樣一早已是中大的研究重點。幾十年前，張樹庭教授就在真菌遺傳學方面做了領先的研究，開創了「蕈

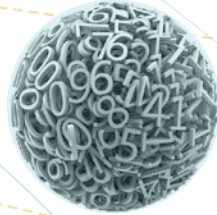
菌科學」。今天，姜里文教授在植物發現新的細胞器，也開闢了令人振奮的新天地。

中大的自然科學學科聞名遐邇，這要歸功於大批傑出的化學家和物理學家，還有如諾貝爾物理學獎得主楊振寧教授這些大力支持的友好。謝作偉教授致力製造出難以想像的巨大碳硼烷，還有朱明中教授追縱縹渺的中微子，都是尋根究柢的例子。

菲爾茲獎得主和沃爾夫數學獎得主丘成桐教授是中高校友，在數學上屢有重大創見，而他在中大的數學家同行也忙於在這片土地上開墾耕耘，包括研究一度或二度空間維度中非線性圖案的魏軍城教授。

科學史上充滿組合詞，如楊-米爾斯理論、卡拉比-丘流形，這些組合詞隱含著合作與競爭。中文大學的研究從來不乏團隊合作，既有校內同事間協力，也有夥同學生或其他院校學者的研究。本書介紹了一些研究團隊和他們的工作。不過，這裡的介紹也只是管中窺豹，難以全面呈現中大學者群所做的蓬勃研究工作——無論基礎研究還是應用研究。





The German-born American rocket engineer Werner von Braun (1912–77) once said: “Basic research is what I am doing when I don’t know what I am doing.”

Basic research can sometimes obfuscate not only laymen but also the scientists themselves, probably because it often seeks to answer basic questions like how life begins, the origin of the universe or why, in the words of Bertrand Russell, “numbers hold sway above the flux”.

In 1990, the first twins in Hong Kong produced from frozen-thawed embryos in test-tubes were born, a result of the efforts in embryo preservation and implantation by CUHK medical researchers. CUHK researchers continue to take on life’s mysteries, as can be seen in the work of Prof. Chan Hsiao-chang on epithelial ion channels and their roles in human infertility.

Plant life has also been the subject of CUHK’s research focus from the early days. Decades ago, Prof. Chang Shu-ting’s pioneering work in fungal genetics had inaugurated the “Mushroom Science”. Today, exciting new grounds are being opened up, for example, by Prof. Jiang Liwen’s discovery of a new organelle in plants.

CUHK has developed strong disciplines in the physical sciences, credit to a long line of outstanding chemists and physicists but not least to supportive friends like

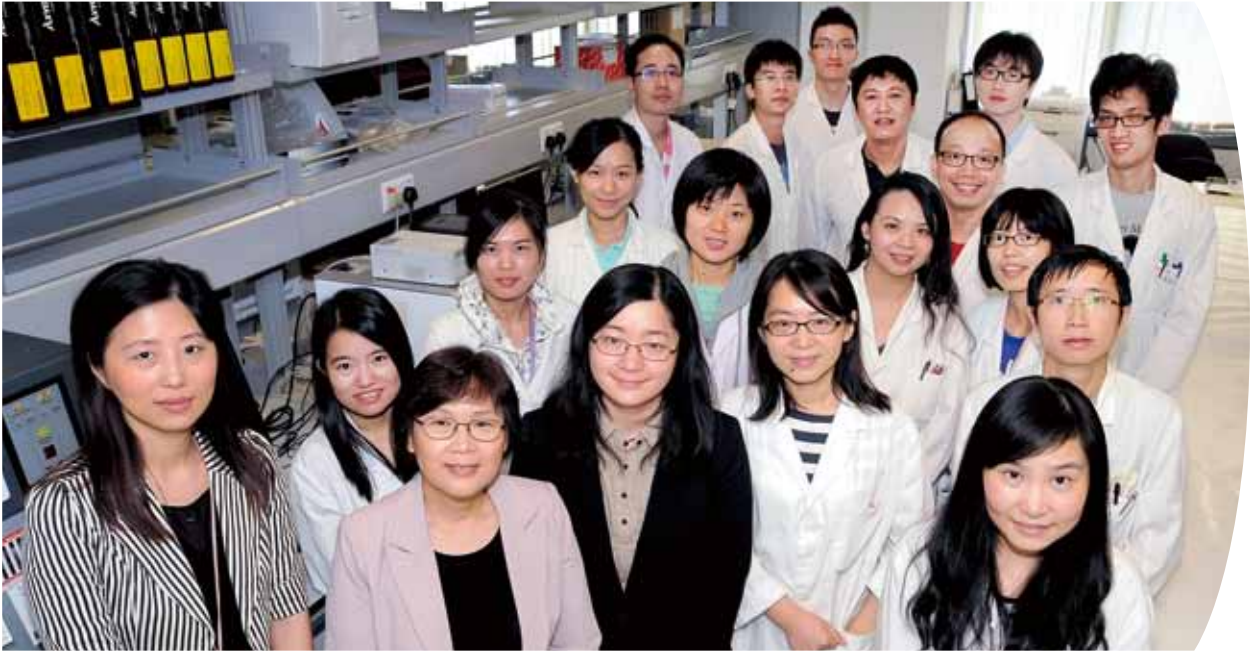
Prof. C.N. Yang, Nobel laureate in physics. The quest to get to the basic answers is exemplified in Prof. Xie Zuowei’s building a large carborane hardly imaginable at the time, and Prof. Chu Ming-chung’s courting of the elusive neutrinos.

Prof. Yau Shing-tung, CUHK alumnus, Fields Medalist and Wolf Prize laureate in mathematics, has made many seminal discoveries in his career. His fellow mathematicians at CUHK are busy with tilling the many parcels in the field, including Prof. Wei Juncheng in non-linear patterns in spatial dimensions.

The history of science is full of conjugated terms—e.g., the Yang–Mills Theory, the Calabi–Yau manifolds—denoting collaboration and emulation. CUHK has no lack of team work in research, whether it be among colleagues or involving students or peers from other institutions. Some teams and their work are presented in this volume. But such a glimpse can in no way do justice to how vibrantly research, basic or applied, is being carried out by the community of scholars on campus.



通往生命之道



陳小章教授(前排左二)與她的研究團隊

Prof. Chan Hsiao-chang (2nd left, front row) and her research team

陳小章教授對離子通道和上皮細胞的研究興趣，始於在芝加哥大學從事博士後研究期間。當時囊性纖維化跨膜電導調節器(CFTR)基因複製成功，科學界欣喜莫名，但關注點主要是CFTR與囊性纖維化引發的肺部疾病的關係，而陳教授則對CFTR變異能引起不育等多種機能失調的現象感到興趣。由於CFTR能調節多種其他離子通道，與這些通道互相影響，陳教授的研究遂超越CFTR，擴展至上皮離子通道的範疇，從而瞭解人體內多種疾病的病理。

1993年，陳教授加入中大生理學系，繼續從事上皮細胞內離子通道和信號轉導的研究。當時黃宜定教授研究男性生殖道的上皮細胞，為她帶來靈感，開始研究女性的生殖道，瞭解上皮離子通道如何影響男女生殖道的生殖功能。

解開生殖之謎

多年來有關生殖機能的多項重要發現，陳教授均有顯著貢獻。她的研究團隊就CFTR變異的婦女生育能力下降的現象提出了新解釋，並闡明CFTR如何影響精子的功能和男性的生殖力。最近，她們發現由上皮鈉通道調節的信號發送機制，解開了長久以來的謎

團——胚胎著床的過程如何開始。這些發現提供新線索，有助瞭解生殖過程的奧秘。

由基礎研究邁向未來的臨床應用

1999年，陳教授與中國科學院上海生物化學與細胞生物學研究所張永蓮院士合作，研究附睾內精子成熟的過程。她們發現男性生殖道內有一種新的抗菌肽，有對抗細菌和促進精子能動性兩重功能。這項先驅發現，陸續引發他人後來有關男性生殖道內的防禦素的許多發現，為研究男性不育的診斷與治療以及避孕法提供新基礎。陳教授最近與深圳第二人民醫院合作研究防禦素，為人工輔助生殖開拓新的應用方式。

上皮細胞生物學研究平台

上皮離子通道(特別是CFTR)的多種作用，和上皮細胞在身體機能方面的重要性，促使陳教授設立上皮細胞生物學研究中心。該中心由中大的軍事醫學科學院共同創建，並獲得國家自然科學基金委員會協助和支持。

中心以跨學科的研究方法，以上皮細胞為切入點，吸引了世界各地的權威專家合作從事前沿研究。多項合作取得了突破性成果，相關論文發表於*Science*、*The Lancet*、*Nature Medicine*、*Nature Cell Biology*及*PNAS*等學術期刊。

有關上皮細胞生物學的研究，也培養了中大新一代的科學家，如中心的蔣曉華教授、余小彬教授及阮擘純教授，他們已經準備就緒，開始這門學科新領域的探索工作。

Channel to Life

Prof. **Chan Hsiao-chang**'s interest in ion channels and epithelial cells started during her post-doctoral training at the University of Chicago when the scientific world heralded the cloning of the CFTR gene which encodes an epithelial ion channel. The focus of the scientific community then was on the role that CFTR plays in the lung disease associated with Cystic Fibrosis. Professor Chan, on the other hand, was intrigued by the wide spectrum of disorders, including infertility, resulting from the mutations of CFTR. Since CFTR can regulate and interact with a large number of other ion channels, Professor Chan's interests went beyond CFTR to study epithelial ion channels to understand the pathogenesis of a wide spectrum of pathological conditions and diseases in our body.

Professor Chan was able to further her research interest in ion channels and signal transduction in epithelial cells when she joined the Department of Physiology at CUHK in 1993 and collaborated with Prof. **Patrick Y.D. Wong**, whose work on the epithelial cells of the male reproductive tract inspired her to investigate the female reproductive tract and to understand how epithelial ion channels affect reproductive events in both male and female tracts.

Solving mysteries surrounding reproduction

Over the years, Professor Chan has played a significant role in a number of important discoveries in reproduction. Her team has provided a novel explanation to the reduced fertility in women with CFTR mutations. They also elucidated how CFTR affects sperm function and male fertility. Recently, her team has solved a long-standing mystery of how embryo implantation is initiated, by discovering the signaling mechanism mediated by an epithelial sodium channel. These discoveries shed new lights on our understanding of how life is reproduced.

From basic research to future clinical application

In 1999, Professor Chan collaborated with Prof. **Zhang Yonglian** of the Shanghai Institute of Biochemistry and Cell Biology, Chinese Academy of Sciences to investigate sperm maturation in the epididymis. They discovered a novel defensin peptide in the male reproductive tract with dual function, fighting bacteria and promoting sperm motility. This pioneering discovery led to many follow-up discoveries by others on defensins in the male reproductive tract and provided new ground for the development of diagnosis and treatment methods for male infertility or contraception. Her recent collaboration with Shenzhen Second People's Hospital on defensins further opened up new applications in assisted reproduction.

A research platform for epithelial cell biology

The versatile role of epithelial ion channels, CFTR in particular, and the importance of epithelial cells in body functions prompted Professor Chan to establish the Epithelial Cell Biology Research Center (ECBRC), a joint effort between CUHK and the Academy of Military Medical Science with the help and support from the National Natural Science Foundation of China.

By adopting a multidisciplinary approach with epithelial cells as an interface, the ECBRC platform has attracted many world class authorities from different parts of the world to collaborate in this cutting edge research. The various collaborations have given rise to ground-breaking works published in *Science*, *The Lancet*, *Nature Medicine*, *Nature Cell Biology* and *PNAS*.

Research in epithelial cell biology has also fostered the next generation of scientists in CUHK like Prof. **Jiang Xiaohua**, Prof. **Sidney Yu** and Prof. **Ruan Yechun** from ECBRC who are well on their way to exploring new frontiers in this area.



追蹤中微子至宇宙起源



朱明中教授(左)與參與CERN暑期計劃的中大生郭家希(右)和梁乘宙(中)
Prof. Chu Ming-chung (left) and CERN summer interns Kwok Ka-hei Martin (right)
and Leung Shing-chau John (centre) from CUHK

中大物理系朱明中教授，領導大亞灣實驗香港合作組（成員包括物理系博士研究生陳瀟聰、陸永康、譚耀豪和徐建一），多年來參與中微子研究，為的是探尋萬物起源。

大爆炸時發生甚麼事？

朱教授說：「根據大爆炸理論，一百三十八億年前，宇宙只有能量，隨着宇宙膨脹，能量慢慢轉化為我們今天的物質。但按對稱原則，物質和反物質的產生應該是一一對應的。但今天見到的宇宙絕大部分都是物質，極少數是反物質，反物質不知何故不見了。這是宇宙學和粒子物理學的大懸案。」科學家推斷，宇宙早期的物質比反物質多了一億分之一，憑着這些微的不對稱，卻造成了恆星、星系，甚至有了生命和現在的我們。但究竟因何有一億分之一的不對稱？

神秘的中微子

中微子是在核反應中產生的不帶電粒子，是最輕的基本粒子之一。中微子有幾種不同類型，經常由一種變異成另一種（「振盪」），但穿越空間與物質時幾乎不發生相互作用。由於質量未明的中微子大量存在於宇宙中，而它們不甚遵守對稱，例如楊振寧和李政道兩位教授於1956年提出的宇稱不守恆現象（即左右不對稱），因此它們可能是解開宇宙物質起源謎團的鑰匙。中微子振盪的頻率與中微子「質量差別」直接相關，而振盪幅度則是「混合角」。透過觀察及測量「質量差別」與「混合角」，有助窺探中微子的神秘面目。

大亞灣實驗源起自多年前朱教授與加州大學柏克萊分校的陸錦標教授的一番閒談。核電廠的反應爐產生大量中微子，大亞灣於是成為研究中微子的理想基地。2012年，大亞灣合作組發現了一種新類型的中微子「振盪」，並獲*Science*選為年度十大科學突破之一。2013年8月22日，合作組又公布最新成果，揭示中微子的「振盪」現象與其能量變化的關係，測量出其中一個「質量差別」，並為前一年公布的「混合角」提供更準確數值，為解開宇宙初期組成之謎邁進一步。

窮追不捨

朱教授說，現時中微子成為熱門的研究課題，但下一步還需各國協作：「在大亞灣只能量度反中微子的振盪。很多國家都正計劃下一代的實驗，利用加速器製造一些高能量的中微子，同時製造一些高能量的反中微子，觀測它們在穿過長距離後的振盪有沒有不同。從而量度出一個與『物質反物質不對稱』直接相關的參數。透過運算，看看結果是否能解釋那一億分之一的不對稱。」

Tracing the Neutrino Back to Our Origin

Prof. **Chu Ming-chung** of the Physics Department of CUHK leads the Hong Kong team of the international Daya Bay Collaboration — including PhD students **Chen Xiacong**, **Luk Wing-hong**, **Tam Yiu-ho** and **Xu Jianyi** — in studying neutrinos, in the hope of finding answers to some of the most fundamental questions related to the origin of the universe.

What happened at the Big Bang?

Professor Chu said, “According to the Big Bang Theory, the universe was all energy 13.8 billions years ago. With the expansion of the universe, energy slowly became what is known as matter today. But a big question remains. The Big Bang should have produced the same amount of matter and antimatter. But what we can observe today is mostly matter and very little antimatter. Where have all the antimatter gone? It poses a cosmological and particle physics puzzle.” Scientists infer that in the early phases of the universe, matter exceeded antimatter by a 100 millionth part. This minuscule asymmetry has produced stars, the galaxies, life and us. What is not known is why there is this asymmetry of a 100 millionth part.

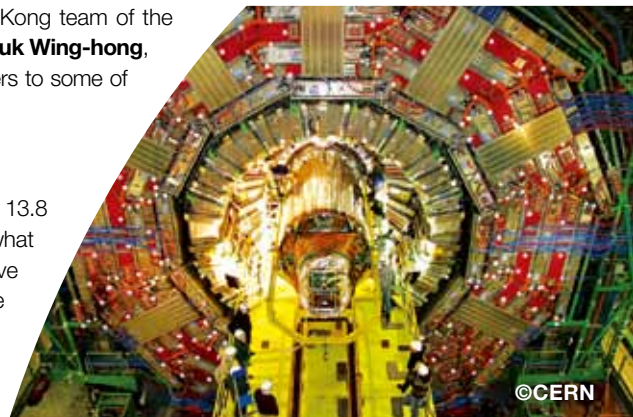
The elusive neutrinos

Neutrinos are uncharged particles produced in nuclear reactions and are among the lightest elementary particles. The several types of neutrino morph from one to another (oscillations) but hardly interact at all as they travel through space and matter. Due to the existence of large numbers of neutrinos and their renowned taste for breaking symmetries — such as the famous violation of left-right symmetry proposed by Prof. **C.N. Yang** and Prof. **T.D. Lee** in 1956 — understanding neutrinos may hold the key to the mystery of the origin of matter-antimatter asymmetry. The frequency of neutrino oscillation is directly related to the neutrino “mass splitting”, and “mixing angle” represents the amplitude of the oscillation. Observing and measuring the “mass splitting” and “mixing angle” would help to elucidate the nature of neutrinos.

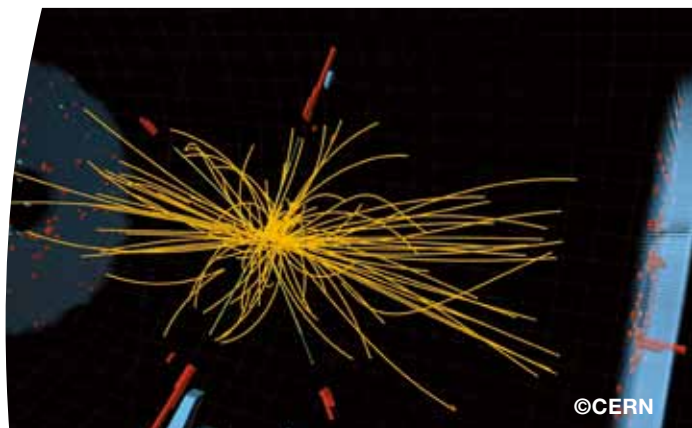
The Daya Bay project started some years ago over a cup of coffee between Professor Chu and Prof. **Luk Kam-biu** of the University of California, Berkeley. Proximity to the nuclear plant has made the location ideal for capturing the neutrinos emitted from the reactors there. The project has involved many physics students from CUHK. The research group at Daya Bay discovered a new mode of neutrino oscillation in 2012, which was selected as one of the “Top Ten Scientific Breakthroughs” of the year by *Science*. Building on that success, the group announced on 22 August 2013 their latest findings on the relationship between neutrino oscillations and energy changes, the measurement of a “mass splitting”. They also provided a more precise and refined value for the “mixing angles” derived in the previous year.

The chase is still on

According to Professor Chu, the neutrino is being studied in many countries but taking the next step requires international collaborative effort. “The Daya Bay experiment can only measure the oscillations of anti-neutrinos. Researchers in many countries are planning the next phase of experimentation: to produce high energy anti-neutrinos as well as high energy neutrinos with accelerators. Observing how these neutrinos and anti-neutrinos vary in their oscillations over long distances give us data that might explain the 100 millionth part asymmetry.”



緊湊渺子線圈實驗所用的矽晶片追跡系統
Installation of the CMS silicon tracking system



大型強子對撞機實驗
CMS experiment at the LHC



大亞灣近點實驗室純水池內的反中微子探測器，各為五米高、五米直徑。

Three antineutrino detectors each 5 m in height and diameter submerged in pure water at Daya Bay

EXPO 的故事

生命科學學院的姜里文教授謙虛地說：「你今天所見的，是幾代學生努力的成果。」他憶述2000年加入中大時，如何「幸運」地招收到第一批研究生。他和歷屆學生在植物細胞生物學的研究上屢有突破，包括發現一種新的細胞器，命名為EXPO(胞吐囊細胞器)，它可以調節植物中蛋白質的非傳統分泌途徑。

細胞器和細胞的關係，就像器官和人體的關係一樣。液泡前體區室(PVC)、多泡體(MVB)、高爾基體、反面高爾基網絡(TGN)和EXPO，都是不同的細胞器，在植物細胞中執行不同的「指揮交通」功能。藉著研究植物中的傳輸系統，我們可以更深入瞭解植物的生長、存活、產量和價值。

從一小步開始

十年前，人們對植物PVC的動態和分子組成所知甚少。姜教授和海德堡大學的研究小組，首先發現MVB是植物細胞內的PVC和晚期核內體，而TGN則是一種早期核內體，把分泌途徑和內吞途徑與植物細胞中的溶解液泡連繫起來。核內體就像植物傳輸系統中的分流處，情形就像發現了傳送細胞物資的高速公路，核內體發揮車站的功能。

研究小組採用多種方法為新蛋白質加上標記，並利用高壓冷凍技術和共焦激光掃描顯微鏡

檢查等方法，研究植物的其他細胞器和傳輸途徑。小組發現了EXPO，這是一種非傳統的分泌方式，在細胞質蛋白質的運送上起著關鍵作用。細胞質蛋白質可以作為抗菌劑，在病原體入侵時保護植物，又在細胞壁的生物合成中起著重要作用。

指揮植物的交通

有些細胞物料會經由傳統的傳輸系統運送，有些則不，此中原因未明，但研究小組2012年在*The Plant Cell*期刊發表論文，解答了部分問題。研究小組發現，經高爾基體定域的擬南芥內膜蛋白十二的羧基端既含有內質網輸出訊號，也有高爾基體保留訊號。這些分流訊號，就像汽車的全球定位系統(GPS)一樣，是植物細胞裡內膜蛋白前往高爾基體的一般機制。

人們大可以假設蛋白質的分泌全靠這些GPS訊號，但在細胞膜外發現無人帶領下分泌出來的蛋白質，卻挑戰了這個假設。沒有GPS導航，這些蛋白質如何到達細胞膜外？植物學界一直忽略這個非傳統的蛋白質分泌途徑，直至姜教授的團隊和兩所德國大學合作，才認真加以研究，尤其是EXPO的作用。

新一代科學家

EXPO的功能和運作之謎正逐步解開，而曾參與以上研究的研究生如謝宇聰、林尚鋌、繆岩松、王涓、丁郁和高彩吉等，目前在國際研究及學術機構均有很好的發展。姜教授期望下一代學生繼續探索植物生物學的新領域。

姜里文教授(左一)與他的研究團隊

Prof. Jiang Liwen (1st left) and his research team



The Story of EXPO

“What you see today is built upon the work of several generations of students,” Prof. **Jiang Liwen** of the School of Life Sciences said humbly. He recounted how “lucky” he was in recruiting his first batch of graduate students when he joined CUHK in 2000. Together, he and his successive batches of students have opened new doors in plant cell biology including the discovery of EXPO (Exocyst-positive Organelle), a novel organelle that mediates an unconventional protein secretion pathway in plants.

Conceptually, one can think of the relationship between organelles and the cell as being similar to that between organs and the human body. Prevacuolar compartments (PVCs), Multivesicular Bodies (MVBs), Golgi apparatus, Trans-Golgi network (TGN) and EXPOs are all different organelles performing different “traffic control” functions in plant cells. By studying the transportation system in plants, one can gain insight into plant growth, development, survival, yield and value.

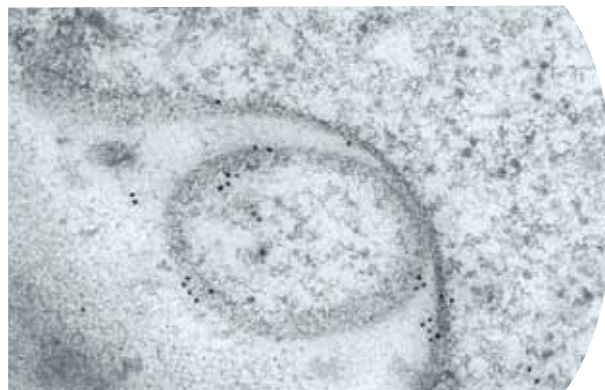
Starting with one small step

Little was known about the dynamics and molecular components of plant PVCs ten years ago. Together with a research group from the University of Heidelberg, Professor Jiang’s group first identified MVBs as being the PVCs and late endosomes in plant cells as well as the TGN being an early endosome merging the secretory and endocytic pathways to the lytic vacuole in plant cells. Endosomes are like a sorting house in the plant transport system. An analogy is that a freeway to transport cell materials was found and proved to be like a traffic depot that has some sorting function.

Using various tagging methods for new proteins, high pressure freezing technique and confocal laser scanning microscopy, the research group performed further research into other organelles and transport pathways in plants. They discovered EXPO which represents a form of unconventional secretion crucial in the transportation of Cytosolic proteins which could be antimicrobial agents crucial to the survival of plants in pathogen attacks or essential for cell wall biosynthesis.

Plant traffic control

It was not clear why some cell materials would go through the conventional transportation system while others would take unconventional secretion pathways like EXPO. In 2012, the group published a paper in *The Plant Cell* that partially answered that question. It was found that the Golgi-Localized *Arabidopsis* Endomembrane Protein 12 contains both endoplasmic reticulum export and Golgi Retention Signals at its C-Terminus. These sorting signals, like a GPS system for a vehicle, represent a general mechanism for EMP targeting to Golgi in plant cells.



EXPO 處於質膜外圍，正準備釋放蛋白質。黑色微點顯示 EXPO 裏蛋白的存在

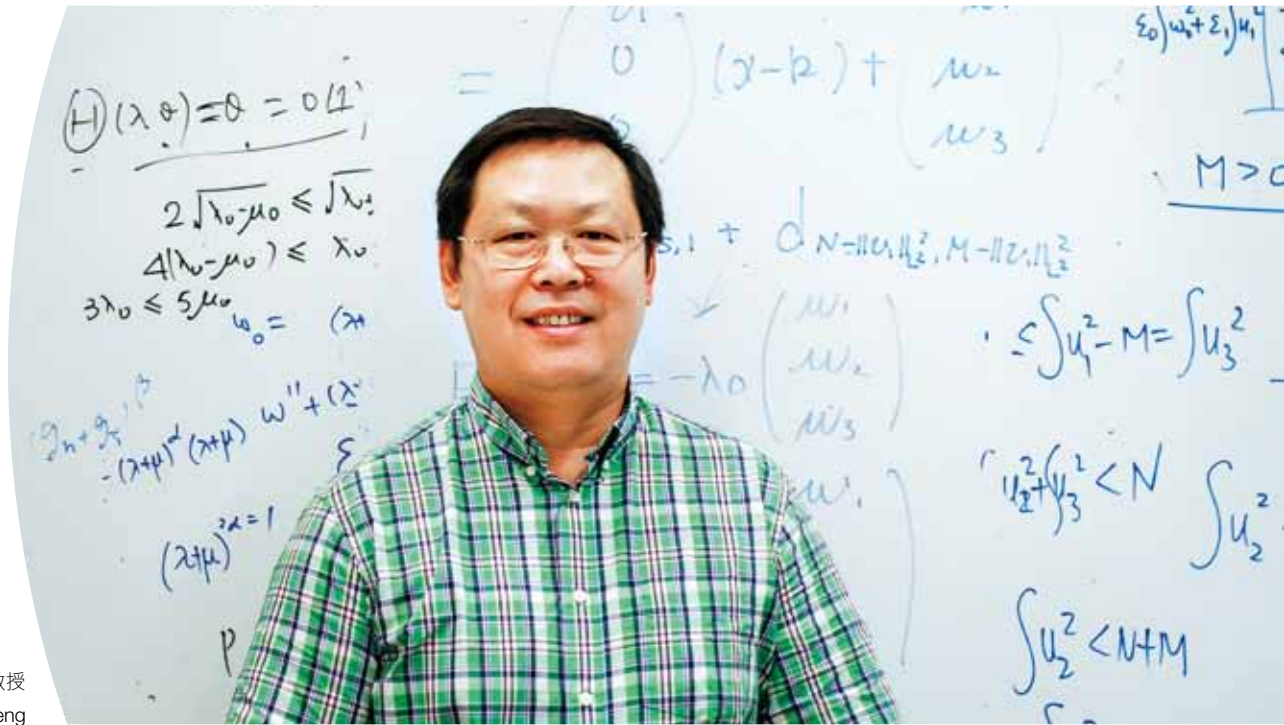
EXPO outside the plasma membrane just before releasing its protein cargo; tiny black dots indicate presence of proteins in EXPO

It is all well if one assumes that protein secretion depends on these “GSP” signals but the discovery of leaderless secretory proteins found outside of the plasma membrane challenges this assumption. How did these proteins get there without a GPS guiding system? This unconventional protein secretion (“UPS”) was largely ignored by the plant community until a collaboration between Professor Jiang’s group and two German universities reviewed the evidence for UPS in plants, especially with regard to EXPO.

New generation of scientists

The puzzles regarding the function and mechanism of EXPO are being solved one by one. Graduate students like **Tse Yu-chung**, **Lam Sheung-kwan**, **Miao Yansong**, **Wang Juan**, **Ding Yu** and **Gao Caiji** who have participated in the above discoveries all have very promising prospects in international research/academic institutions now. Professor Jiang looks forward to the next generation of students to explore new frontiers in plant biology.

變幻原是永恆



魏軍城教授
Prof. Wei Juncheng

動物身上的斑點和條紋、人類皮膚的痣和斑，這些自然出現的圖案，可以用數學解釋嗎？答案是肯定的。其實小至日常購買食物雜貨，大至認識宇宙現象，數學均是不可或缺的工具。在眾多數學模型中，學者最常使用反應擴散系統的偏微分方程，因為當表達某種變數隨時間及空間變化的關係，需要用上偏微分方程的概念。一般物理現象可用簡易數學方程解釋，但若牽涉的變數多，則須使用較複雜的反應擴散方程。

以複雜數學模型解釋複雜現象

曾獲裘槎基金會優秀科研者獎及晨興數學銀獎的魏軍城教授，是偏微分方程範疇其中一名重要學者，其非線性橢圓方程及方程組的凝聚現象分析尤其著名。魏教授曾在多份主要數學期刊發表研究成果，亦是同一範疇內研究成果被引用最多的二十位學者之一。他其中一項重要發現，是成功找出與「德喬吉猜想」有關的反例。

由意大利數學家Ennio de Giorgi於1978年提出的「德喬吉猜想」，是純數學其中一個最著名的猜想，主要針對特定非線性方程的結構。在2006年前所作的研究，均證實該猜想

適用於二維至八維空間，所以學界一直認為該猜想於八維以上的空間同樣合用。直至2006年，魏教授及其研究團隊成功以巧妙的數學計算方法，找到九維空間以上的反例，證明「德喬吉猜想」在九維以上不能成立，同時破解了複雜反應擴散方程的謎團。研究團隊發現，隨著方程中的擴散系數增加，自然界的點紋會逐漸變得不穩定，甚至一分為二或更多，變成更複雜的圖案。這些看似隨機及任意的自然圖案，其實都可以利用數學模型破解。

數學模型的實際應用

為進一步加強非線性偏微分方程及非線性分析的研究，魏教授與中國科學院聯手設立「中國科學院—裘槎基金聯合實驗室」項目，推動有關研究工作，向更多年青學者提供高水準科學訓練。此項目希望促進非線性偏微分方程及非線性分析在數學生物學、流體力學、材料科學等範疇的實際應用，將來成為全國以至全世界的偏微分方程及分析中心。此外，實驗室亦會因應中文大學數學科學研究所和中科院國家交叉科學中心的研究工作，提供數學訓練及協助。

鑑於魏教授在數學方面的貢獻，國際數學家大會已邀請他參與2014年在南韓首爾舉行的第27屆大會，並作一個四十五分鐘的特邀報告。國際數學家大會每四年才舉辦一次，被譽為「數學界的奧林匹克盛會」，對世界各地的數學家而言，能在會上作報告是莫大榮幸。

Mathematical Explanation for Changing Patterns in Nature

Spots and stripes found in animals; moles and spots on human skin; can they be explained in mathematical terms? The answer is definitely yes. Not only that, mathematics is the tool for everything from the daily budget for grocery to cosmic phenomena. The most frequently used model to explain patterns in nature like spots on deer and stripes on zebra are partial differential equations for the reaction-diffusion systems. Partial differential equations come in handy because a differential operator is needed to express the relationship of a variable with time and space. While simple physical phenomena can be easily explained by relatively simple mathematical equations, phenomena that involve more variables would require complex reaction-diffusion equations.

Complex mathematical models for complex phenomena

Prof. **Wei Juncheng**, recipient of the Croucher Senior Research Fellowship and Morningside Silver Medal in Mathematics, is one of the leading figures in the field of partial differential equations, in particular, the analysis of concentration phenomena in nonlinear elliptic equations and systems. His work was published in leading mathematical journals and he is amongst the 20 most-cited authors in his field. One of Professor Wei's major discoveries was finding a counter example related to the de Giorgi Conjecture.

The de Giorgi Conjecture is one of the most famous conjectures in pure mathematics developed in 1978. It concerns the structure of certain nonlinear equations. As it was shown to be true in the second to the eighth dimensions, mathematicians since then have always held that the conjecture would apply in any number of dimensions. In 2006, through an ingenious mathematical method, Professor Wei's team found a counter example in the ninth dimension and show that the de Giorgi Conjecture could not have applied in any dimension higher than the eighth.



This finding also helped solve the complex reaction-diffusion equations. It was found that with the increase of the diffusion parameter in the equations, the spots found

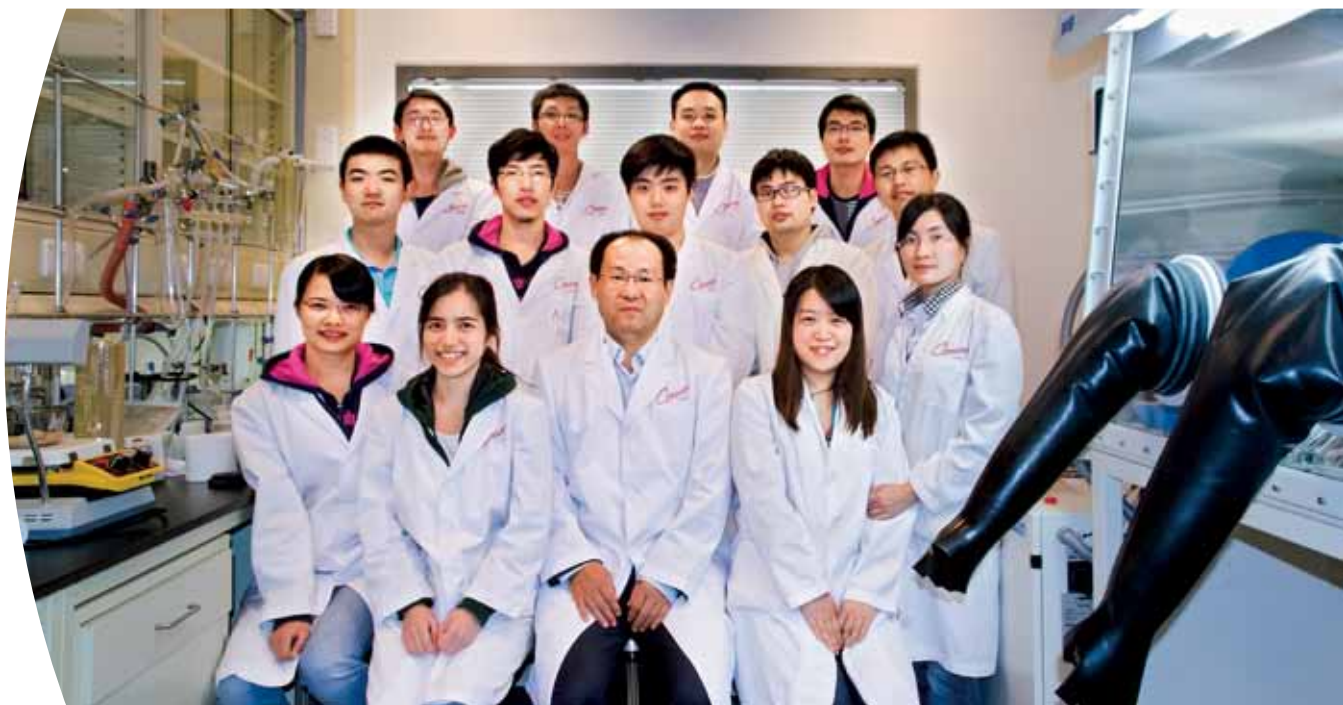
in nature would become unstable and might split into two or even more to form complex patterns. What seem to be random and haphazard patterns in nature can actually be deciphered by mathematical models.

Practical applications of mathematical models

To further strengthen the research in nonlinear partial differential equations and nonlinear analysis, Professor Wei collaborated with the Chinese Academy of Sciences (CAS) and established the CAS-Croucher Joint Laboratory (the Lab) on "Nonlinear Partial Differential Equations and Nonlinear Analysis". There are two missions of the Lab. The first mission is to provide top-level scientific training of PhD students and young researchers in these fields. The second is to conduct research beyond theoretical advances in Nonlinear PDEs/Nonlinear Analysis. The Lab will encourage practical applications of Nonlinear PDEs/Nonlinear Analysis in mathematical biology, fluid mechanics, material sciences, etc. It is the vision of Professor Wei and his collaborators at CAS that this will become the center for PDEs/Analysis in China as well as in the world. It will provide mathematical training and research that will complement the work of the Institute of Mathematical Sciences at CUHK and the National Interdisciplinary Science Center at CAS.

In recognition of his contributions, the International Congress of Mathematicians (ICM) has invited Professor Wei to give a 45-minute talk at its 27th congress to be held in Seoul in 2014. This is a rare and most prestigious honour for a mathematician as ICM is held every four years, an occasion considered the Olympics of the Mathematicians.

把不可能變成可能



謝作偉教授(前排中)與他的研究團隊

Prof. Xie Zuwei (centre, front row) and his research team

2002年6月，在例行的研究小組討論中，化學系的謝作偉教授留意到學生提交的一些有趣數據。這些數據並非當日討論的主題，卻給他帶來這樣的想法：也許可以合成一種十四頂點碳硼烷，這是過去四十年來世界各地沒有任何研究人員做到的。事實上，在2003年之前，十三頂點碳硼烷也只是理論。

謝教授說：「做研究必須心思縝密。切勿忽略細節，因為天使很可能就在細節中。一些不顯眼的事物，可能帶來重大的發現。」自此，研究小組艱苦作戰，要合成至今為止所知最大的碳硼烷籠——十四頂點碳硼烷。

碳硼烷是碳和硼原子組成的一種群組，在熱力和化學上相當穩定，但這種穩定性其實是一把雙刃劍，一方面使它成為聚合物、陶瓷及以硼為基礎的癌症治療的理想基本塊(功能性碳硼烷)，另一方面卻使合成大型碳硼烷的過程極為困難。

究竟是什麼一回事？

化學家的夢想一直是構建超級分子，以模仿自然界分子的奇妙功能。試把這些碳和硼原

子想像為不同大小的珠子，把化學粘結作用想像為不同強度的絲線，謝教授的研究就是探討以不同的方法和組件，把這些珠子串起來。最終這些珠串有部分可以成為珠寶首飾、輸送帶的部件、機械零件、籠子等。試想像這十四頂點碳硼烷是世界最大的分子貨物載體，可用作輸送藥物，很可能是下一代的含硼癌症藥物。以最佳方法串起珠子的第一步若做得不夠好，談論它的下游應用方法也是徒然。

合成過程

發現這超級碳硼烷的過程中採用的合成方法，可作為產生功能性碳硼烷的新策略，本身是另一個有趣的故事。謝教授請學生在兩個碳原子之間建立連接環，以限制原子的活動。由於短的連接環難以合成，學生合成了很長的連接環，似乎有違原有目的。但細看數據之下，謝教授發覺有了這長長的連接環後，實際上可以在籠內多放置兩個硼原子。其意義在於經過進一步發展，這超級碳硼烷開發成為含硼癌症藥物時，同一劑藥物便含有十二個硼原子，而非十個。含硼癌症藥物的有效劑是硼，它能抑制癌細胞的多種酶活性。這種含有十二個硼原子的新分子，可能大大增加含硼癌症藥物的效能。

謝教授及其團隊成功合成至今最大的碳硼烷籠——十四頂點碳硼烷的報告，發表於行內地位最崇高的 *Angewandte Chemie International* 期刊上，大家都引以為榮。他們取得了一般認為幾乎不可能的成就。

Making the Impossible Possible

During one of the routine research group discussions in June 2002, Prof. **Xie Zuwei** of the Department of Chemistry noticed some interesting data that were presented to him by his students. Although these data were not the main topic of discussion, they nevertheless gave him the idea that perhaps it was possible to synthesize a 14-vertex carborane, something that no research group in the world had been able to achieve for the last 40 years. As a matter of fact, the 13-vertex carborane was only talked about on a theoretical level before 2003.

“It is important to be meticulous in research. Never overlook the details as the angel may well be in the detail. The unobvious could be the gateway to important findings,” said Professor Xie. So the group embarked on an uphill battle to synthesize the largest carborane cage known to date, a 14-vertex carborane.

Carboranes are a class of clusters consisting of carbon and boron atoms. They are thermally and chemically stable, thus ideal as a basic block (functionalized carboranes) in polymer, ceramics and boron based cancer therapy. On the other hand, the stability makes it extremely difficult to synthesize large carboranes.

What is this all about?

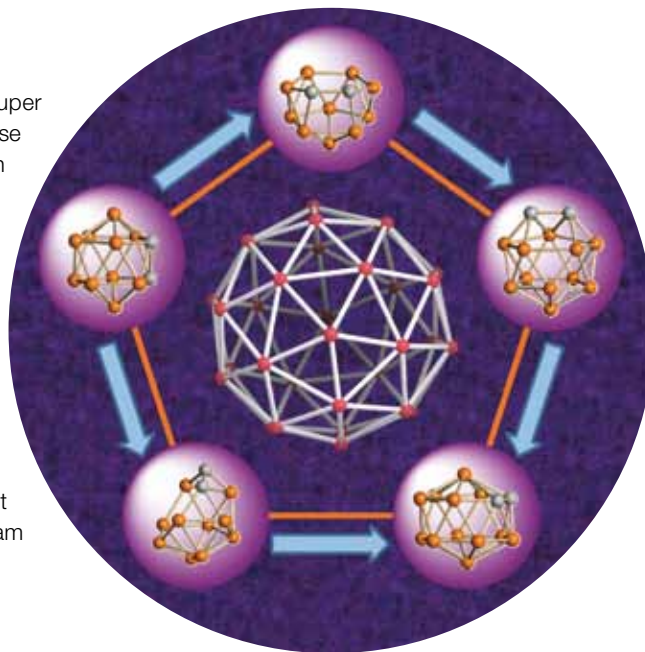
It has always been the dream of chemists to build super molecules that can mimic the amazing functions of those in the natural environment. Imagine all these carbon and boron atoms being beads of varying sizes and the chemical bonds as threads of varying strengths. Professor Xie's research tries to find different ways and components to link these “beads”. Eventually some of these stringed beads could find their way into jewelries, conveyer belts, machinery parts, cages, etc. Picture this 14-vertex carborane as the largest molecular cargo carrier in the world which could be used for drug delivery and may well be a candidate for the next generation of boron cancer drug. Without the first step of stringing up the beads in the best possible manner, it is futile to think about its downstream applications.

The synthesis

The synthetic method used in the discovery of this supercarborane can also serve as a new strategy for generating functionalized carboranes, which is another interesting story. The students were asked to create a link between the two carbon atoms to limit their movement. Instead of a short link, which is difficult to synthesize, the students synthesized a long link which seemed to fail the

mission. However, upon studying the data, Professor Xie noticed that it was actually possible to insert two more boron atoms into the cage with this long link. The implication is that further down the road, when this supercarborane is developed into boron cancer drugs, the same dose of drug will have 12, instead of 10 boron atoms. The effective agent of a boron cancer drug is the boron. Its activity on cancer cells is based on the inhibition of a variety of enzymatic activities. This new molecule with 12 boron atoms may greatly enhance the efficiency of the drug.

Professor Xie's group proudly published their successful synthesis of the largest closed-cage carborane known to date, a 14-vertex carborane, in *Angewandte Chemie International*, the most prestigious journal in the discipline. They have achieved something thought to be nearly impossible.



14-頂點硼碳烷的合成路線

Synthetic routes to 14-vertex carborane

方標

THE

BENCHMARKS



中大自五十年前創校起，就把研究視為主要使命之一。在這半個世紀，中大發展成研究型綜合大學，在諸如文學、人文學科、科學和社會科學等多個領域樹立標竿，開創新局面、啟風氣之先。

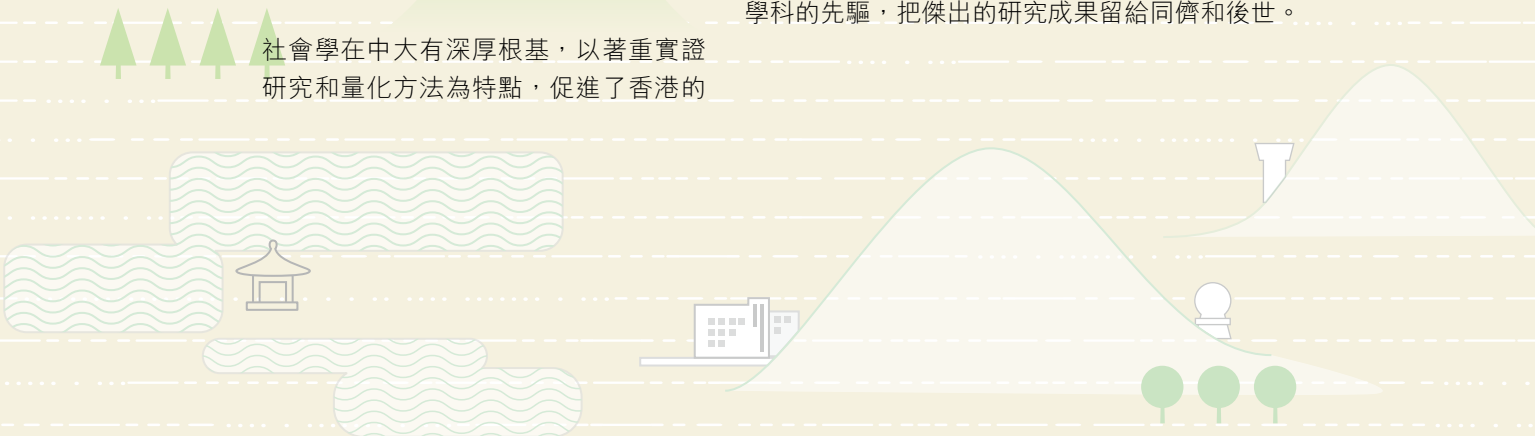
創校初期的中大是新儒家的重鎮，唐君毅、牟宗三和劉述先等新儒家代表人物均在中大任教。1988年，劉殿爵教授與陳方正博士開展古文獻資料庫計劃，把浩如煙海的先秦兩漢傳世文獻整理成電子資料，供研究漢學和中文的學者使用。另一項重要工作是香港文學特藏，這個研究現代香港文學和文化不可多得的資料庫，幾乎全由盧瑋鑾教授獨力完成。

社會學在中大有深厚根基，以著重實證研究和量化方法為特點，促進了香港的

社會研究，又為中國大陸培養社會學家，影響十分深遠。中大學者以開發跨文化參照和測試而在人類行為研究領域佔有一席之地，最著名的是張妙清教授領導開發的跨文化(中國人)個性測量表。中大的運動科學研究在國際學術界和本地體壇均享負盛名，王香生教授領導的團隊就是當中的榮華大者。

中大前校長兼諾貝爾物理學獎得主高錕教授，不但革新了電訊技術，還為中大的工程學奠下穩固根基。今天楊偉豪和李碩彥兩位教授在網絡編碼方面所做的創新工作，正為瞬息已過時的資訊科技編寫新的一章。在香港這個鼻咽癌多發地區，黃潘慧仙教授和羅國煒教授的開創性研究，為詳細了解和更有效治療此病樹立了楷模和標準。

除了上述學者外，中大還有許多努力突破窠臼、提升學科的先驅，把傑出的研究成果留給同儕和後世。





Ever since its inception 50 years ago, CUHK has embraced research as one of its primary missions. Within a half century, it has developed into a comprehensive research-orientated university and topped the bench and left its marks in many areas in the arts, the humanities, the sciences and the social sciences.

In the early days, the University was the cradle of Neo-Confuciansim and home to its representative figures such as Tang Chun-i, Mou Tsung-san and Liu Shu-hsien. In 1988, the late Prof. D.C. Lau and Dr. Chen Fong-ching initiated the CHANT (Chinese Ancient Texts Database) project which eventually made the entire corpus of extant pre-Han and Han classical texts available electronically to sinologists and Chinese scholars. Another undertaking, the Hong Kong Literature Archive almost singlehandedly completed by Prof. Lo Wai-luen, has become an essential resource for the study of contemporary Hong Kong literature and culture.

Sociology, with an emphasis on empirical research and quantitative methods, had a very solid beginning at CUHK and made its mark in promoting social research in Hong Kong and in training sociologists on the mainland. The study of human behaviour is distinguished by the development of cross-cultural references and tests, most notably the Cross-cultural (Chinese) Personality Assessment Inventory led by Prof. Fanny M.C. Cheung. Sport science research at CUHK has impact on

international academic communities as well as local sport fields, as the group led by Prof. Stephen H.S. Wong has demonstrated.

Prof. Charles K. Kao, former Vice-Chancellor and Nobel Laureate in Physics, had not only revolutionized telecommunications technology but also laid a firm foundation for the engineering sciences at CUHK. Today, Prof. Raymond Yeung and Prof. Robert Li's seminal work in network coding is rewriting the rapidly outdated annuals of information technology. In a region where nasopharyngeal cancer is a common form of cancer, the late Prof. Dolly P. Huang and Prof. Lo Kwok-wai's pioneering work has laid down the model and standard practice for better understanding and treatment of the disease.

In addition to those mentioned above, many more trailblazers at CUHK have broken old molds, forged new tools and vocabularies, and bequeathed their formidable legacies to their peers and successors.

香港運動科學研究的發展



王香生教授(右三)與他的研究團隊
Prof. Stephen Wong (3rd right) and
his research team

過去十年，香港市民日益認識運動的重要性。本港運動員在奧運會及其他國際大型運動比賽屢獲佳績，越來越多市民亦會每天恆常運動。一直致力於發展相關學術課程及運動科學研究的中文大學，在提升社會對運動的關注方面，著實功不可沒。

中大體育運動科學系的**王香生**教授帶領的運動營養及體力活動研究小組，對推廣運動意識發展貢獻良多。小組定期與來自各國的醫學、公共衛生和地理學等專業的研究人員交流，論述運動營養、運動表現等課題，並探討鄰里環境對體力活動和社會心理行為的影響，以及人類生命期各階段的運動狀況。

體力活動及健康的文化殊異研究

研究小組與香港大學運動及潛能發展研究所及地理學系合作，成功利用加速計、環境審核工具及地理信息系統(GIS)，計算出孩童在兩年間體力活動量及飲食習慣的變化，並在特定社會生態模式內，辨認出不同層面的決定因素的穩定性及改變。研究發現，孩童在小學早期階段的體力活動量下降程度，明顯高於其他時期；此時家長的鼓勵及環境配合非常重要，能協助削弱下降程度。研究成果有助家長及決策當局制定有效干預政策，向我們的下一代推廣健康生活模式。

另一個由小組與澳洲迪肯大學協作的研究，則主要針對中國兒童，探討其體力活動量及螢幕前坐式行為的相互關係。其中一個有趣發現是功課與體力活動未必成反比，不少花很多時間做功課的女生，仍然能兼顧體力活動。研究亦指出在制定相關干預政策時，應考慮多個層面及性別殊異的因素，以有效推廣較高活動量的生活模式，減少中國兒童的坐態活動時間。早前中大一名博士生更獲頒發澳洲研究毅進獎學金，資助其在此方面深入研究，更鞏固了小組與澳洲大學的協作關係。

為精英運動員提供實證支援

研究小組另一個重點探討範圍，是運動營養如何影響表現，其中昇糖指數為主力研究項目。小組曾在中大的運動生理學實驗室，為香港足球總會多個代表隊進行表現測試，期望為本土運動員提供運動科學的持續支援。小組亦曾為香港賽馬會多名專業及見習騎師進行一連串運動科學評估，希望提升其健康水平，改善狀態，減少因賽事導致長期傷患的機會。小組也透過與北京體育大學合作，為學生帶來研究精英運動員表現的寶貴機會。

跨學科運動科學研究

王香生教授表示：「跨學科及跨機構研究對我們而言非常重要；我們可以藉此與國際科學社群合作，不論在校內或校外，都能將訊息傳達至本地運動專才及相關產業人士。」

The Development of Sport Science Research in Hong Kong

Over the last decade, Hong Kong has witnessed an enhanced awareness of the importance of sports. Our athletes made significant achievements at top international events such as the Olympics and we see an increased number of people engaging in physical activity (“PA”) on a daily basis. CUHK, through its academic programmes and research in the area of Sports Science and Physical Education, has undoubtedly played an important role in raising this awareness.

The Sports Nutrition & Physical Activity Research Group led by Prof. **Stephen H.S. Wong** of the Department of Sports Science and Physical Education (“SSPE”) has consistently contributed to this development. The Group regularly collaborates with researchers from different countries and disciplines like Medical Science, Public Health and Geography to provide insight on sports nutrition and exercise performance, the effect of neighborhood environment on PA and psychosocial behaviour and human movement across the lifespan.

Culture-specific research on physical activity and health

The Group collaborated with the Institute of Human Performance and Department of Geography of The University of Hong Kong to locate where and when children’s PA declines. Using accelerometers, environmental audit tools, and geographic information systems (GIS), the research has tracked changes of PA and eating behaviour over a two-year period and has identified the stability and changes in the multilevel determinants within the social ecological model. It was found that PA declined significantly during the early years of primary schoolchildren. Parental support and a supportive physical environment play an important role in attenuating this decline. The findings will help parents and policymakers formulate effective intervention strategies to promote a healthy lifestyle for our next generation.

A collaborative study with Deakin University of Australia has examined the correlates of PA and screen-based behaviour in Chinese children. One of the interesting findings of this study was that homework and PA did not seem to be contradictory to each other. Those girls who spent a lot of time doing homework still managed to participate in PA. The study also suggested that interventions should consider multiple and sex-specific factors for promoting an active lifestyle and reducing sedentary time among Chinese children. The established collaboration with Australian universities is further strengthened by a PhD student being awarded a prestigious Endeavour Research Fellowship to conduct further impactful research in this emerging area.

Evidenced-based support to elite athletes

Another research focus of the Group is sports nutrition with emphasis on the application of the glycemic index in exercise performance. As part of an ongoing sports science support to athletes, the Group has conducted performance testing on various national team squads from the Hong Kong Football Association at the Exercise Physiology Laboratory at the SSPE Department. Professional and apprentice jockeys from the Hong Kong Jockey Club have undergone a battery of sports science assessments with a view to enhancing their health and wellness and reducing their overall predisposition to sustaining injury during races. A unique opportunity for our students to conduct research on the performance of elite athletes was provided through the Group’s collaboration with Beijing Sports University.

An interdisciplinary approach to sports science research

“We treasure an interdisciplinary and inter-institutional approach in our research. By doing that, we are able to reach the international scientific community and influence local professionals in sport and health-related industries, including both school and non-school settings,” said Professor Wong.



利用加速度計記錄學童的體力活動水平
Using accelerometers to measure physical activity levels of children



抽取血液樣本以監測運動過程中的生理反應

Venous blood samples can indicate the physiological responses to exercise

中西思想交匯



張妙清教授
Prof. Fanny M.C. Cheung



攝於1985年北京的**中譯MMPI工作坊**；(前排左五至七)明尼蘇達大學James Butcher教授、張妙清教授，以及中國科學院宋維真教授
Chinese MMPI Workshop, Beijing, 1985;
(Front row left 5th to 7th): Prof. James Butcher, University of Minnesota; Prof. Fanny M.C. Cheung; and Prof. Weizhen Song, Chinese Academy of Science

中大心理學系長期致力在心理學範疇提出中國人獨有的角度，多年來從事的跨文化研究已證明主流心理學有需要建立泛文化模型，以瞭解人類行為。

搭建中西的橋樑

第一本有關中國心理學的全面著作，是由心理學榮休講座教授**彭邁克**編著的《牛津中國心理學手冊》。心理學系其他成員也曾翻譯和修訂西方重要的心理測試，包括**張妙清**教授和**梁永亮**教授分別對明尼蘇達多項人格測驗(MMPI)和阿肯巴克實證衡鑑系統的研究。有的學系成員更進一步為中國人開發本土的心理測試，包括**陳瑞燕**教授的香港文字記憶學習測試，以及張妙清教授及其團隊的跨文化(中國人)個性測量表(CPAI)。

當中，CPAI已被視為貢獻超越西方測量方法的首個非西方個性測試。量表結合了文化特殊性(emic)和文化普適性(etic)的方法，測量不同文化的人格特徵。

測量工具的源起

張教授說：「七十年代我返回香港不久，翻譯了業界普遍採用的MMPI，提供實證工具作臨床之用。其後我們和中國科學院合作，製作統一的MMPI中文本。我們後來想：為什麼要借用西方的工具？何不開發我們自己的人格測驗方式？於是，我們開始以心理學的科學評核方法，結合文化知識，開發CPAI，以瞭解中國人的性格。

「最初，我們從不同的來源，如小說、諺語、調查等，收集不同的個性描述，目的是建構一個既切合中國文化，又符合既有評核工具應有的科學標準的測量表。」

CPAI第一版在1991年完成，經過修訂和重新標準化的第二版則在2002年面世。為了更好地瞭解一生各階段人格的發展過程，2003年CPAI開發了青少年版本。時至今日，CPAI已翻譯成六種語言，在中國人以外的社會也有採用。

差異中見普遍性

張教授說：「我們發現，許多人格特徵在不同文化中是共通的，但西方的評核工具卻忽略了一個層面：人際關係。西方心理學較專注個人層面，而中國人性格中的一個重要部分，則體現在人際上，例如和諧、對關係的重視等。CPAI的跨文化研究顯示，這些元素並非中國文化所獨有，而是強調集體主義的文化所共有的。」

CPAI挑戰以西方為中心的主流心理學。以文化特殊性和文化普適性相結合的方法開發測試，現已被視為本土和跨文化評核的楷模。CPAI亦可用作臨床評估，在輔導、招聘、培訓和事業發展等方面幫助落實決定。中大的心理學學者，在人類行為科學的範疇建立了標準，並拓闊了這門科學的文化疆界。

Meeting of the Minds, East and West

The Department of Psychology at CUHK has long been committed to rendering and promoting a distinctive Chinese voice in psychology. Its cross-cultural research has presented a clear and strong case for mainstream psychology to answer to the need for a pan-cultural model for understanding human behaviour.

Building bridges across East and West

The first comprehensive volume on Chinese psychology, *The Oxford Handbook of Chinese Psychology*, was edited by **Michael Bond**, emeritus professor in Psychology. Other faculty members have developed best practices in translating and adapting major western psychology tests, including the Minnesota Multiphasic Personality Inventory (MMPI) by Prof. **Fanny M.C. Cheung** and the Achenbach System of Empirically Based Assessment by Prof. **Patrick W.L. Leung**. Some of them have gone on to develop indigenous psychological assessment for the Chinese people, including the Chinese List Learning Test by Prof. **Agnes S.Y. Chan** and the Cross-cultural (Chinese) Personality Assessment Inventory (CPAI) by Prof. Fanny M.C. Cheung and her team.

Among these, the CPAI has been recognized as the first non-western personality test that demonstrates research support for its incremental contributions beyond western measures. By adopting a combined emic-etic approach, it established a platform for assessing personality traits across cultures.

The origin of the assessment tool

Professor Cheung said, “Soon after I returned to Hong Kong in the 1970s, I translated the MMPI, one of the most widely used personality tests to provide evidence-based assessment for clinical practice. We later collaborated with the Chinese Academy of Sciences to standardize a common Chinese version of the MMPI. We then pondered: why should we borrow from Western tools and not develop our own personality measure? We set out to develop the CPAI by combining scientific assessment methods of psychology and cultural knowledge to understand Chinese personality.

“We began by collecting diverse personality descriptions from various sources — novels, proverbs, surveys, etc. Our goal was to construct an inventory that is relevant to the Chinese cultural context while meeting the scientific standard expected of established assessment tools.”

The first version of the CPAI was completed in 1991. The 2002 revised and re-standardized second version had 28 normal personality scales, 12 clinical scales and three validity scales. To better understand personality development throughout life, an adolescent version of the CPAI was developed in 2003. Today, CPAI has been translated into six languages and has applications in cultural contexts beyond the Chinese population.

Universality in variety

Professor Cheung said, “In our study we found that many personality traits are universal across cultures; but there was a dimension neglected by western assessment tools — interpersonal relatedness. Western psychology has focused more on individualistic dimensions while an important aspect of Chinese personality is characterized by interpersonal dimensions such as harmony and relationship orientation. Cross-cultural studies arising from CPAI show that these elements are not unique to Chinese culture but found in cultures where collectivism is given emphasis.”

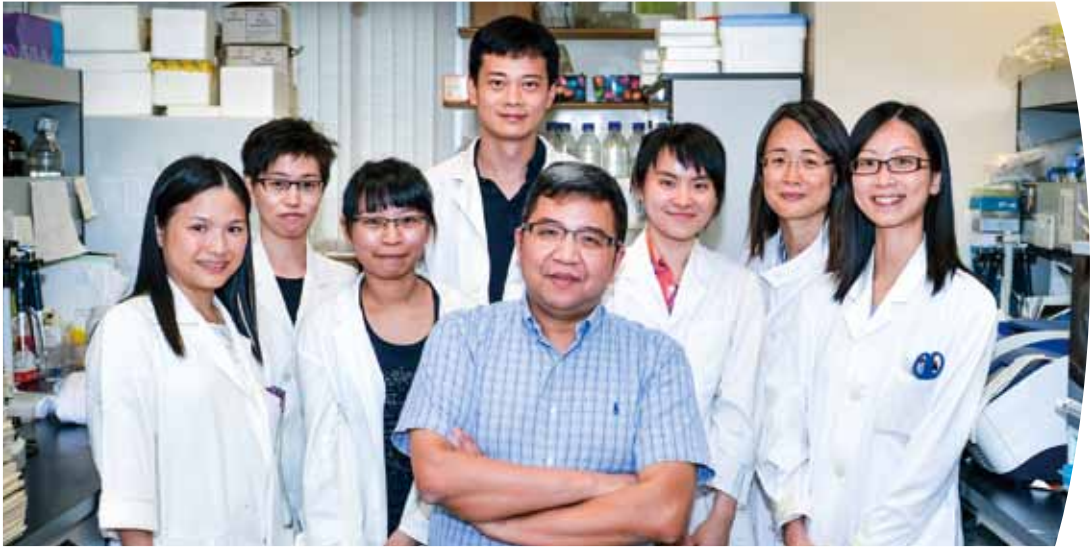
Research with the CPAI has challenged Western-centred mainstream psychology to recognize the need for incorporating a cultural perspective in assessing personality. The combined emic-etic test development method is now regarded as a role model for indigenous and cross-cultural assessment. The CPAI can be used for both normal personality testing and clinical assessment to assist decisions in counseling, staff recruitment, training and career development. The psychology scholars at CUHK have laid down benchmarks for and expanded the cultural boundaries in the science of human behaviour.



CPAI 近期研究成果深圳論壇·深圳·2013：(前排左一至五)上海師範大學范為橋教授、中大王茜教授、中國科學院張建新教授、張妙清教授，以及北京大學甘怡群教授

CPAI Researchers' Meeting, Shenzhen, 2013; (Front row left 1st to 5th): Prof. Weiqiao Fan, Shanghai Normal University; Prof. Qian Wang, CUHK; Prof. Jianxin Zhang, Chinese Academy of Science; Prof. Fanny M.C. Cheung; and Prof. Yiqun Gan, Peking University

對抗「廣東瘤」的路線圖



羅國煒教授(中)與他的研究團隊
Prof. Lo Kwok-wai (centre) and his research team

中大是從基因學和基因組的角度研究鼻咽癌的先驅。這地位由已故的**黃潘慧仙**教授(1935—2004)奠定。黃教授的研究團隊採用多種全基因組研究方法，例如等位基因分型、比較基因組雜交技術，以及微陣列分析，率先發表以下研究結果：

- 第三對染色體的短肢消失，顯示鼻咽癌病人經歷重要的基因變化
- *p16* 及 *RASSF1A* 基因的改變，導致發生鼻咽癌
- 鼻咽癌基因圖譜

黃教授的學生、病理解剖及細胞學系的**羅國煒**教授繼承了這方面的工作，對鼻咽癌的研究有重大貢獻。他們2004年在 *Cancer Cells* 期刊上發表的腫瘤模型，在醫學界獲得廣泛承認。

為什麼研究鼻咽癌？

鼻咽癌在亞洲十分普遍，八成病例在南中國和東南亞的中國人之中發現，發病率遠高於西方國家。科學家認為飲食習慣、EBV 病毒感染和遺傳因素都可誘發鼻咽癌。二十年下來，羅教授的研究團隊發現，EBV 病毒感染後的基因及表觀基因異常現象，是促使腫瘤形成的必具因素。

放射性治療可以有效醫治早期的鼻咽癌。可惜早期鼻咽癌的徵狀並不明確，到後期治療

起來已很困難，療效也較遜色。羅教授的團隊的工作，是辨識鼻咽癌的致癌基因，以便有效治療鼻咽癌，以及開發分子標靶藥物。

有關鼻咽癌的近期發現

羅教授與合作研究人員對鼻咽癌發展過程中的基因異常現象展開有系統的篩查，研究一系列腫瘤組織樣本、細胞系和異種移植，採用陣列比較基因組雜交技術，分析鼻咽癌腫瘤的基因資料，顯示多個可能的標靶致癌基因，可以作為進一步研究的基礎。具體而言，他們研究了11q13染色體的 *CCND1* 基因(內有 *Cyclin D1* 因子)和12p13染色體的 *LTBR* 基因(內有乙型肝炎病毒受體因子)的功能，發覺這些因子在原發性鼻咽癌腫瘤樣本中擴增和過度表現的情況十分普遍，顯示兩種因子對鼻咽癌腫瘤的發展起着關鍵作用。

另一項與國際研究人員合作的國際項目，以全轉錄體定序分析法，發現了8.3%的鼻咽癌病例當中，有新的 *UBR5-ZNF423* 轉化融合基因。這基因的表現，可導致某些鼻咽癌病例的轉變。這些發現首次證明基因重新排序在鼻咽癌中起着重要作用。

下一個里程碑

這些重要的發現，為鼻咽癌標靶治療的研發工作奠定基礎：抑制鼻咽癌的致癌基因，如 *UBR5-ZNF423* 等，有助治療鼻咽癌。研究團隊打算利用大型的平行基因排序方法，把引致鼻咽癌的所有基因變化記錄下來。這些發現，將為個人化的癌症治療提供重要的新生物標記和治療指標。

The Roadmap to Fight “Cantonese” Cancer

The pioneering position in genetic and genomic research on nasopharyngeal cancer (“NPC”) at CUHK was anchored by the late Prof. **Dolly P. Huang** (1935–2004). Using various genome-wide approaches such as allelotyping, comparative genomic hybridization (“CGH”) and microarray analysis, Professor Huang’s group was the first to report the following findings:

- key genetic changes in NPC patients as indicated by the loss of short arm of Chromosome 3
- alterations in the *p16* and *RASSF1A* genes drive the development of NPC
- NPC genome map

Professor Huang’s protégé, Prof. **Lo Kwok-wai** of the Department of Anatomical and Cellular Pathology, continues the legacy and contributes significantly to the research in NPC. The NPC tumorigenesis model they published in *Cancer Cells* in 2004 has since been well recognized in the medical circles.

Why study Nasopharyngeal Cancer?

NPC is a common cancer in Asia. 80% of the cases occur in Southern China and among Chinese in the Southeast Asian region, a much higher percentage than their western counterparts. Scientists suggested that a combination of environmental factors, like dietary preference, infection by the Epstein-Barr virus (EBV) and genetic make-up could result in the onset of NPC. For the past two decades, Professor Lo’s group found that the subsequent genetic and epigenetic abnormalities after the EBV infection are necessary to drive the tumorigenic process.

At its early stages, NPC can be effectively treated by radiotherapy. Unfortunately, the symptoms of NPC are highly nonspecific until it is in an advanced stage, when treatment is much more difficult and less effective. Professor Lo’s group is engaged in the quest to identify the oncogene of NPC to enable efficient treatment of NPC as well as development of molecular target drug.

Recent discoveries of genetic and epigenetic changes in NPC

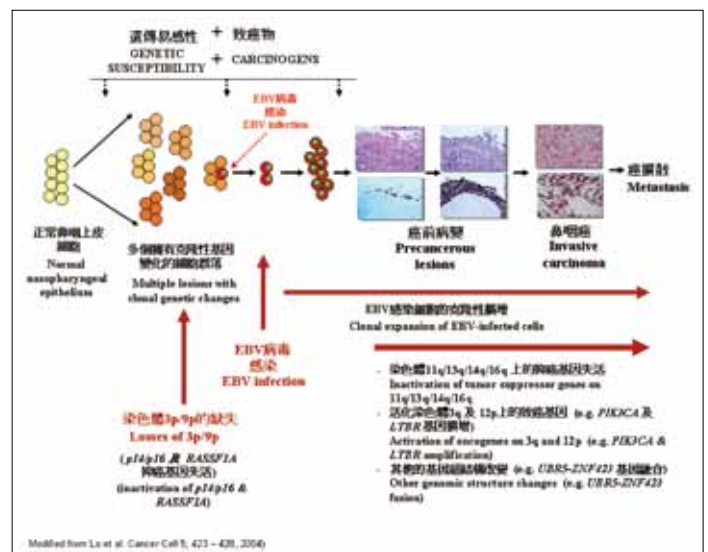
Professor Lo and his collaborators commenced a systematic screening for genetic abnormalities involved in the development of NPC. They have studied a panel of tumour tissue samples, cell lines and xenografts. The array-based CGH process they used to map the genetic information of the NPC tumours provided a number of possible NPC oncogene targets for further research in NPC. Specifically, they have performed functional studies on the *CCND1* gene at chromosome 11q13, which encodes the protein Cyclin D1 and the *LTBR* gene at chromosome 12p13, which encodes the protein lymphotoxin beta receptor. They have found that the amplification and over expression of these proteins are

common in the primary NPC tumour samples. Both of them were shown to be critical to the development of NPC tumours.

Another international collaboration between local colleagues and those from Canada, France and Korea discovered a novel UBR5-ZNF423 transforming fusion gene in 8.3% of NPCs by whole-transcriptome sequencing. The expression of this gene might contribute to the transformation of a subset of NPCs. This is the first evidence to support the important role of gene rearrangement in NPC.

Next milestone, the finest genome map of NPC

These important findings lay the foundation for the development of targeted therapy for NPC by inhibiting the NPC-associated oncogenes such as the UBR5-ZNF423 protein. Using massive parallel genome sequencing, the group plans to catalogue the whole spectrum of genomic changes involved in NPC tumorigenesis. The findings from this endeavour will provide important novel biomarkers and therapeutic targets for the development of personalized cancer therapy.



鼻咽癌腫瘤模型

Nasopharyngeal Cancer Tumorigenesis Model

為香港文學研究奠基



盧瑋鑾教授
Prof. Lo Wai-luen

香港獨特的地理、歷史與政治環境，堆積成華語地區獨一無二的土壤，不少過客和土生土長的作家，在此孕育出璀璨的文學作品。無論是回顧歷史或展望未來，香港文學都是彌足珍貴的文化資產。

中大香港文學研究中心顧問盧瑋鑾教授（小思）治學謹慎細微，以文學研究為職志，決意為香港本土的文學尋索其在中國現代文學發展史上的地位。

尋寶獵珍 鍥而不捨

有感於學界對香港文學研究材料未予應有重視，以致中國多位現代文學巨匠，諸如魯迅、茅盾、戴望舒、蕭紅等，雖均曾在香港生活、講學，而有關的資料竟日漸散佚，盧教授於是決意整理香港文學材料，冀能為有關研究規劃範疇，揭示方向。她上下求索，埋首學府圖書館的館藏，穿梭街巷，走訪大小書店，舊書攤檔，搜尋埋沒未聞的香港文學材料。舊報章、剪報、文學雜誌、經典著作、絕版孤本、作家札記、書信、相片……，這些不起眼的素材，一一經她撥開封塵，躬自爬梳，並一筆一畫抄錄下珍貴材料，分門別類，製成資料卡片，存放鞋盒子裏，後來更擴充至無數膠箱、檔案櫃，排列有序，擠滿住所和辦公室。

誨人不倦的盧教授發掘知識、整理知識、創造知識、傳授知識而不擁之以自居。她將畢生珍藏的文學材料視為「公器」，2002年自中文系榮休後，盧教授將其搜集的香港文學

文化書刊及作家資料檔案，捐贈予大學圖書館，使圖書館得以成立「香港文學特藏」，並在前副館長黃潘明珠女士的協助下，建立網上「香港文學檔案」。盧教授說：「我一人的力量不能盡用這些資料。整理之後，利用科技公之於世，所有人都用得著，更加理想。」

本地經典重現

除了2002年的大批捐贈外，至今盧教授仍然搜購並聯繫各界人士，將珍貴文獻及重要書刊贈與圖書館。現在文學特藏包含作家、學者手稿信函及文獻逾九百種，書籍超過二萬七千冊，期刊超過一千種。此外，網上的「香港文學檔案」包含超過三萬八千條香港文學及文化研究材料，成立以來，廣受海內外學者推崇，咸認為是迄今最齊備的香港文學研究寶庫。

盧教授以一人之力，愚公之志，為香港文學研究提供了完整的圖像，制定了具體的範疇。半世紀以來踏實治學與研究的成果，為有志於描摹香港文學面貌的後來者，奠定了堅實的研究基礎。她的素願是研究者可以在這些資料中找出自己有興趣的課題精研下去，給香港文學一個公平而合理的書寫。



香港文學檔案網站

The online Hong Kong Literature Archive

Laying the Foundation for the Study of Hong Kong Literature

The geographical location, historical background and political environment of Hong Kong have formed a unique habitat in Chinese-speaking regions for writers, whether homegrown or just visiting, to create resplendent literary works. Whether in the past or in the future, Hong Kong literature would always be a cultural asset that should be treasured.

Prof. **Lo Wai-luen** (aka **Xiao Si**), Adviser to the Hong Kong Literature Research Centre of CUHK, is meticulous, careful and serious in her scholarship. She sees the study of literature as her calling and is determined to explore the position of native Hong Kong literature against the backdrop of the historical development of contemporary Chinese literature.

An untiring treasure hunt

Professor Lo found that a good number of major authors in contemporary Chinese literature had lived or taught in Hong Kong, but relevant materials and literary data were fading into oblivion. So she decided to direct her efforts towards the preservation and proper management of materials on this subject, with a view to deriving future parameters and direction for literary research in the territory. She then buried herself in the library collections of various universities, travelled through streets and lanes, visited bookstores large and small all over Hong Kong as well as stalls and shops selling used books to look for materials on Hong Kong literature that were little known. Whether it was old newspapers, news cuttings, literary journals, classical works, books out of print, writers' reading notes, letters, photographs ... she recovered all of these, personally sifted through them, transcribed precious materials word by word, classified them, produced data cards and stored them in shoe boxes and, later, plastic boxes and file cabinets.

Driven by an amazing pedagogic zeal, Professor Lo has dug out, sorted, created, and passed on knowledge to her students. She treats her lifelong collection of literary materials as public assets. When retiring from the Chinese Department in 2002, she generously gave her entire collection of books and journals on Hong Kong literature and culture, files and data on writers, etc., to the University Library to form the Hong Kong Literature Archive. With the assistance of Mrs. **Rita Wong**, then Deputy Librarian, she established an electronic database on Hong Kong literature. "I myself cannot make full use of these materials," said Professor Lo, "It is better to sort them out and make them public with the use of technology so that everybody can use them."

A local canon is born

Further to the bulk donation in 2002, Professor Lo is still sourcing and liaising with various parties for precious materials

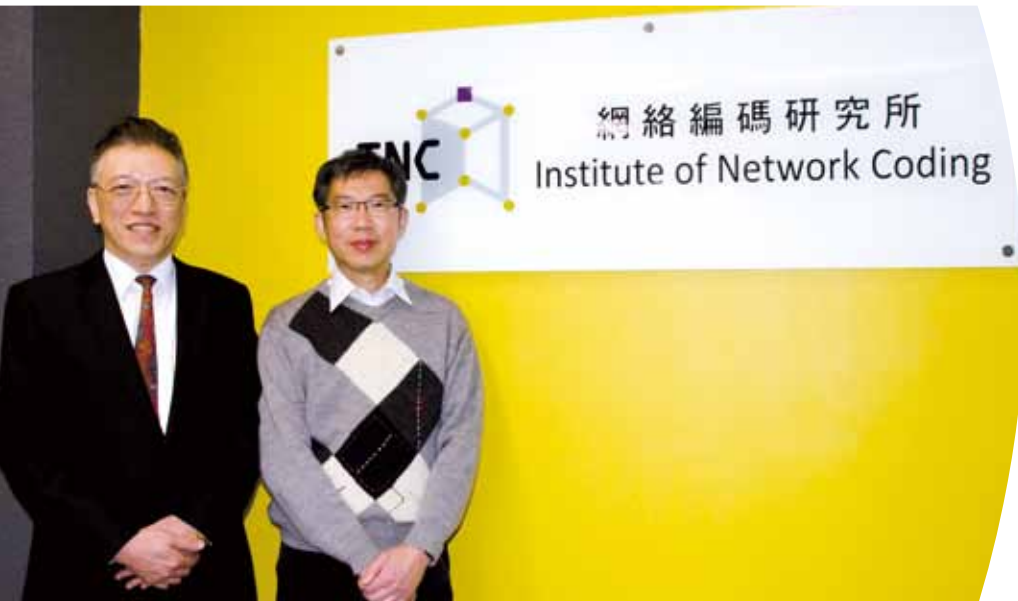
and important books and journals, and give them to the Library. By now, the Hong Kong Literature Archive boasts over 900 items of letters and documents of writers and academics in manuscript, over 27,000 volumes of books, and over 1,000 titles for periodicals. The online database on the subject consists of over 38,000 entries. It has been widely applauded by both scholars, local and overseas, as the most comprehensive collection for pedagogical study of this subject.

The results of Professor Lo's half-century of intense scholarship have laid a solid foundation for successors who are called to research work on Hong Kong literature. It is the wish of Professor Lo that researchers can pick from these source materials their areas of interest and do thorough research on them, thus painting a fair and reasonable picture of the literature of Hong Kong.



香港文學特藏
Hong Kong Literature Archive

網絡通訊新典範



李碩彥教授(左)與楊偉豪教授(右)
Prof. Robert Li (left) and Prof. Raymond Yeung (right)

一直以來，電話、互聯網及其他通信網絡的數據傳輸，均沿用存儲轉發機制，運作模式與郵遞系統大同小異——將包裹從甲地送到乙地，再送往丙地，如此類推。然而，數據與包裹不同，可經「編碼」及「解碼」。所以自80年代起出現過一些傳輸模式，數據在傳輸期間並沒被存儲，反而被分解及混併，最終在接收端被解碼，或轉換回本來的信息。

資訊傳輸的優點

雖然這個數據傳輸的另類方法已經存在一段日子，但卻一直未得到正式認可或廣泛應用，除了1988年的兩個例子，分別為用作磁帶數據存儲的磁碟陣列(RAID)面世，以及中大信息工程學系教授李碩彥，當時於美國新澤西州Bellcore所作有關優化傳輸通道容量的研究。另一個例子是中大卓敏信息工程學講座教授楊偉豪及美國南加州大學的張箴教授，於1997年進行的衛星通訊研究。

應用實例有了，但始終未出現相通的數學程式或結構模型，可以打破研究範疇之間的藩籬，連結上在相關但不同領域內孜孜工作的研究人員及理論家。

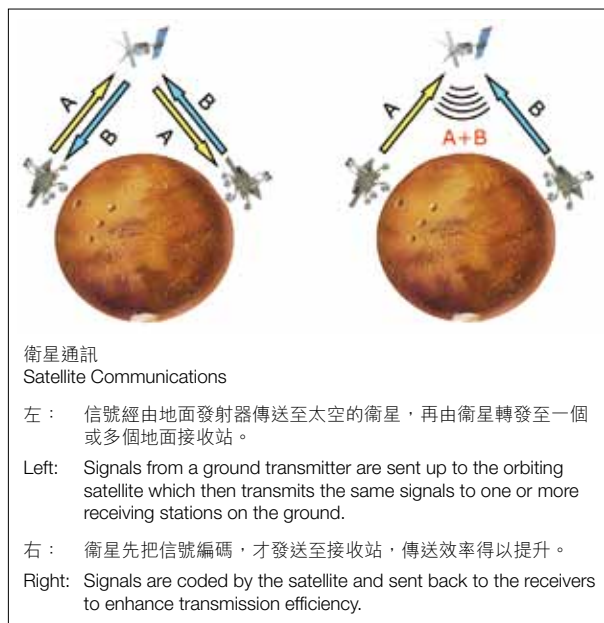
蝴蝶的孵育

1997年夏天，楊偉豪教授在與張箴教授合作研究的基礎上，開始與德國俾勒菲特大學的

蔡宁博士，共同研究如何普遍應用此種新的傳輸方式。同年9月，楊教授就此議題與當時忙於撰寫一本開關電路理論著作的李碩彥教授進行討論，這次討論對兩人來說都意義重大。就是在這次討論中，李教授以「蝴蝶網絡」來勾畫出網路編碼的好處。雖然兩人關注的理論及實用觀點均有不同，但都因「蝴蝶網絡」的突破而振奮，而李教授更不惜放下寫作近兩個月，全心投入完善「蝴蝶網絡」的理論細節。

正因如此，網路編碼產生了兩種理論。第一種是楊教授及蔡博士以資訊理論方式制定的非線性理論；第二種是李教授藉「蝴蝶網絡」的線性代數基本原理所發展出的線性理論。後來非線性理論與「蝴蝶網絡」於2000年7月一篇名為“Network Information Flow”的論文中正式發表，這兩種理論都證實網路編碼比存儲轉發在效率上優勝得多。

線性網路編碼採用簡單易行的編碼／解碼機制，演算上亦較簡潔。自2003年起，網路編碼愈發成為熱門的研究題目，對研究網路資訊流向有革新的影響。李教授、楊教授及蔡博士憑2003年一篇題為“Linear Network Coding”的論文，獲得電機電子工程師協會(IEEE)資訊理論協會2005年度論文獎。中大亦獲大學教育資助委員會的卓越學科領域計劃資助，成立了網路編碼研究所，由李教授和楊教授共同領導。



衛星通訊
Satellite Communications

左：信號經由地面發射器傳送至太空的衛星，再由衛星轉發至一個或多個地面接收站。

Left: Signals from a ground transmitter are sent up to the orbiting satellite which then transmits the same signals to one or more receiving stations on the ground.

右：衛星先把信號編碼，才發送至接收站，傳送效率得以提升。

Right: Signals are coded by the satellite and sent back to the receivers to enhance transmission efficiency.

New Paradigm of Network Communications

The conventional way of data transmission, such as over a telephone network or on the Internet, was like postal delivery — one station forwards the parcel to the next, and on to the next and so forth. This transmission mode is called “store-and-forward”. Since the 1980s, there have been a few instances where data did not get stored but broken up and mixed during the transmission process and which were decoded or converted back to their original message at the receiving end. Commodities of real objects do not enjoy this malleability as data, which can be coded and decoded, do.

Advantage of information over commodity

For decades, however, the implications of this alternative way of transmitting data had not been fully recognized or its application explored, with two exceptions in 1988: the introduction of “Redundant Array of Independent Disks” in magnetic data storage; and the work of Prof. **Robert Li**, Professor at the Department of Information Engineering of CUHK, on optimizing the capacity of transmission channels while he was with Bellcore in New Jersey. Another example was the work on satellite communications in 1997 by Prof. **Raymond W. Yeung**, Choh-Ming Li Professor of Information Engineering of CUHK and Prof. **Zhen Zhang** of the University of Southern California.

All was very well except that no common mathematical formulation or structural model had emerged to break down disciplinary barriers and connect the dots as well as the different researchers and theoreticians working in disparate but related fields.

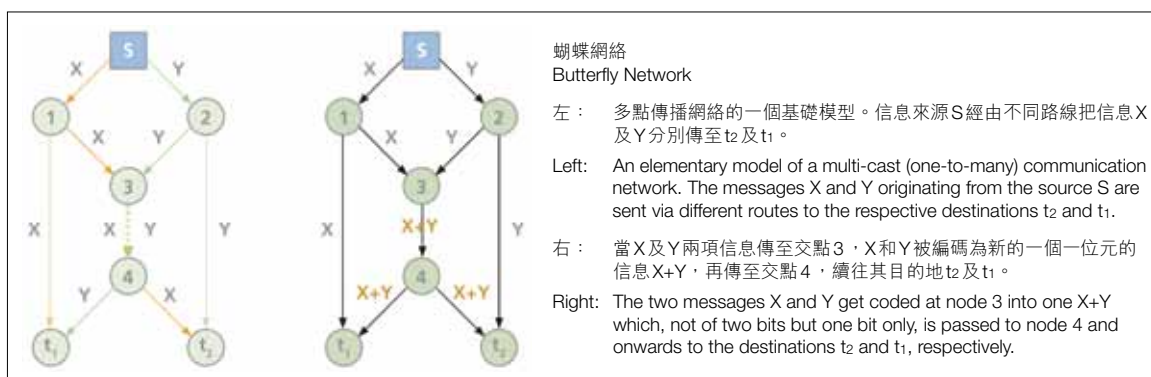
A butterfly was born

In the summer of 1997, following up on his work with Professor Zhang, Professor Yeung started working with Dr. **Ning Cai** of the University of Bielefeld, Germany on applying the new mode of transmitting data in a general setting. In September he discussed his work in Germany with Professor Li, who at that time was thick in the writing of a book on switching theory. In what turned out to be an extremely important meeting between the two, Professor Li worked out

a simple illustration of the benefit of Network Coding (NC), now known as the Butterfly Network. Although each of them had his own theoretical and/or practical preoccupations, both of them were fascinated by the Butterfly Network. The algebraic significance behind the Butterfly Network was so compelling that Professor Li actually suspended his book writing for almost two months to devote himself to working out further details.

Two theories of NC were born as a result. First, a nonlinear theory was formulated in an information-theoretic way by Professor Yeung and Professor Cai. Second, a linear theory was formulated by Professor Li as a linear-algebraic generalization of the Butterfly Network. Eventually, the nonlinear theory, together with the Butterfly Network, was published in a journal paper entitled “Network Information Flow” in July 2000. Two different formulations of a general setting both proved the superior efficiency of NC over the “store-and-forward” mode.

Linear NC adopts linear coding/decoding mechanisms, which are easy to implement in practice. They also keep the theory mathematically tidy. Since 2003, NC has been an increasingly popular research topic and revolutionized the study of data flow through networks. Professor Li, Professor Yeung and Professor Cai won the 2005 IEEE Information Theory Society Paper Award with their 2003 paper entitled “Linear Network Coding”. The achievement in NC has led to the establishment of the Institute of Network Coding in CUHK, funded by an Areas-of-Excellence grant and co-directed by Professor Li and Professor Yeung.



育 成

THE BENEFITS

曾獲諾貝爾獎的科學兼著名散文家 Peter Medawar (1915–87) 說過：「如果政治是嘗試的藝術，那麼研究便肯定是解決問題的藝術。兩者都非常實事求是。」的確，研究與它為人們或廣大社會帶來的影響和益處是密不可分的。

著眼於可以解決的問題，實事求是，或許是香港這個商業中心的最佳寫照。張惠民教授在無線射頻辨識技術方面的研究，是中文大學商科研究走在尖端的好例子。

醫學創新可以治療頑疾，挽救無數人命。在1990年代初，中大進行香港首次小兒骨髓和肝臟移植，並以微創手術治療老年黃斑病變。今天，中大在多個領域仍然推陳出新，包括上消化道出血的防治和心臟再同步化治療。

盧煜明教授開創的嶄新產前診斷方法，令許多準媽媽大感安

心，他正開發更加重要的診斷法。辛世文教授和林漢明教授的水稻和大豆研究，影響深遠，千千萬萬人因而受惠。

全球暖化是學童都耳熟能詳的課題，惟真正著手處理問題的人不多。吳恩融教授令我們更加認識我們棲居的城市，並教導我們如何能令它更宜居住和更舒適。

中大學者心繫弱勢社群，推動社會服務不甘後人，如流金頌和博群計劃等均，無怪乎多位學者獲頒獎項，嘉勉其人道精神。繼梁秉中教授、吳恩融教授之後，致力為有聽覺障礙兒童提供正常教育的鄧慧蘭教授最近也獲殊榮。

或存心濟世，或適意為善，澤惠社群的中大學人，比比皆是，限於篇幅，本書只能摘擷題之，述其大概。然其廣大同儕仍各本其學養旨趣，專心致志鑽研學問，改善我們的生活、呼吸的空氣、飲食的素材以至培育後代的方式，為功甚巨。



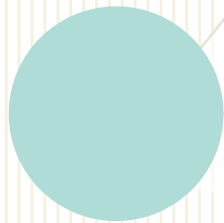


Peter Medawar (1915–87), a Nobel scientist and famed essayist, once said, “If politics is the art of the possible, research is surely the art of the soluble. Both are immensely practical-minded affairs.” Research is indeed rarely separable from the effects it has on and the good it does to the people or society at large.

Soluble and practical-minded. Perhaps no two words better describe the commercial hub that is Hong Kong. Prof. Cheung Waiman’s study of the RFID technology is a good example of the cutting edge relevance of business research at CUHK.

Medical innovations can lead to the saving of the lives and limbs of millions. In the early 1990s, CUHK performed the first paediatric marrow and liver transplants in Hong Kong, and innovated in the use of microsurgery to treat age-related macular degeneration. Today, CUHK still leads in, among other things, the prevention and treatment of upper gastrointestinal bleeding and cardiac resynchronization therapy.

Prof. Dennis Lo has reassured many an expecting mother with his groundbreaking prenatal diagnosis and is moving on to developing an even more significant diagnostic methodology. What Prof. Samuel Sun and Prof. Lam Hon-ming have been doing in rice and soybean is so fundamental and important that the recipients of the benefits number in the millions.



Every schoolboy has heard of global warming, but very few are doing real things to help. Prof. Edward Ng has taught us a few things about the city we live in and what we could do to help make it a little more habitable and comfortable.

And let us not forget about the disadvantaged. CUHK scholars often lead social service initiatives such as CADENZA and I • CARE. No wonder some of them have been given humanitarian laurels. Prof. Leung Ping-chung, Prof. Edward Ng, and more recently Prof. Gladys Tang, who has brought as normal an education as possible to hearing impaired children.

Space permits only a cursory look at a small sample of scholars who have become, wittingly or unwittingly, Good Samaritans. Their other colleagues at CUHK, in their pure pursuits of what intellectually prod them on, are making far-reaching contributions to how we live, breathe, eat and raise our children.



領導亞洲廠商的供應鏈管理革命



張惠民教授
Prof. Cheung Waiman



亞洲供應鏈及物流研究所所長張惠民教授表示：「假如你從事製造業，而客戶又是Macy、JC Penny、沃爾瑪等美國大型連鎖零售店，那麼你別無選擇，必須為產品採用RFID技術。從2010年起，我們留意到業內迅速採用RFID技術，Macy's Inc便規定在2012年內，所有成衣均附以RFID標籤。沃爾瑪的Sam's Club其後亦推出類似政策，供應商的貨品若無附上RFID晶片，不論邊際利潤有多少都必須繳付服務費。」

RFID——令大型零售店勝算在握的工具

RFID是無線射頻辨識系統的簡稱，並非新科技。它的亮點在於應用在零售業時，有助控制存貨量，方便管理連鎖零售店。用家希望得知的有關個別貨品的任何數據，只靠一塊晶片便可全數貯存，以感應器可隨時讀取數據，從而妥善管理貨品。

RFID是很有用的工具，可以提高利潤，為股東帶來最大價值。近年的一些成功故事，均說明偉大的科技本身未必足夠，科技的應用和管理才會大大改變社會行為。要滿足今天顧客對信息的無盡渴求，是推動大型零售店採用RFID技術的其中一項因素。亞洲供應鏈及物流研究所從這目標出發，並更進一步銳意革新零售業的未來經營方式，改變客戶行為。

是否所有廠商都須登上RFID的列車？

對於涉及許多不同零件和生產工序的產品來說，RFID技術可發揮較大的作用，例如電話手機廠商便比家具廠商更能受惠於RFID技術。不過，長遠來說，廠商若要保持競爭力，便要能配合客戶的及時存貨政策。

廠商可向GS1 (www.gs1hk.org) 的本地分支尋求協助。GS1是業界主導的非牟利組織，負責訂立供應鏈標準，並提供有關供應鏈管理的信息及培訓。儘管有這個組織，許多問題仍有待解答；亞洲供應鏈及物流研究所在這方面便能發揮作用。首先，研究所推出了開創性的研究項目，研究RFID在成衣業的應用。選擇成衣業為研究對象，是因為這是香港一項重要的工業。張教授的團隊，是為成衣業提供這類服務的首個研究隊伍。他們的目標，是在短期內把研究範圍擴展至其他工業。

除了統籌和從事有關供應鏈管理的學術和應用研究外，研究所還舉辦培訓課程，傳授必要的知識，讓廠商以成本效益良好的方式採用RFID技術，協助亞洲廠商在全球工業界提升競爭力。課程範圍涵蓋開發基礎設備、培訓人才，以至收集和分析數據等，讓廠商充分掌握RFID技術。

Leading the Revolution in Supply Chain Management for Asian Manufacturers



手提RFID 儀器是盤點好幫手
Hand-held RFID in stock checking

"If you are in the manufacturing business and you service big US retail chains like Macy, JC Penny and Wal-Mart, it is no longer a matter of choice but necessity to adopt RFID on your products," commented Prof. **Cheung Waiman**, Director of Asian Institute of Supply Chain & Logistics (the "Institute"). "Starting from 2010, we have observed a rapid adoption of RFID technologies with Macy's Inc requiring to have all its garments tagged by RFID within 2012. Sam's Club of Wal Mart followed suit by imposing a service charge to suppliers for products without an RFID chip. This is regardless of the profit margin of the item to be supplied."

RFID, the holy grail in every big retailer's boardroom

RFID, Radio Frequency Identification, is not a new technology. The excitement revolves around its application in minimizing inventory and retail chain management. The whole system consists of a chip which will store all the "desired" data a user wants for an item while the sensor can readily read them for further management use.

RFID is an invaluable tool to enhance margin performance and maximize shareholders value. Recent success stories have repeatedly demonstrated that a great technology by itself often does not succeed by itself, it is how the technology is used and managed that greatly impacts changes in social behaviour. One of the motivating factors for the big retailers to adopt RFID is aimed at satisfying the insatiable information

need of today's consumers. The Institute focuses on moving this objective forward to revolutionize how retail business is done in future and hence another success story in redefining consumer behaviour.

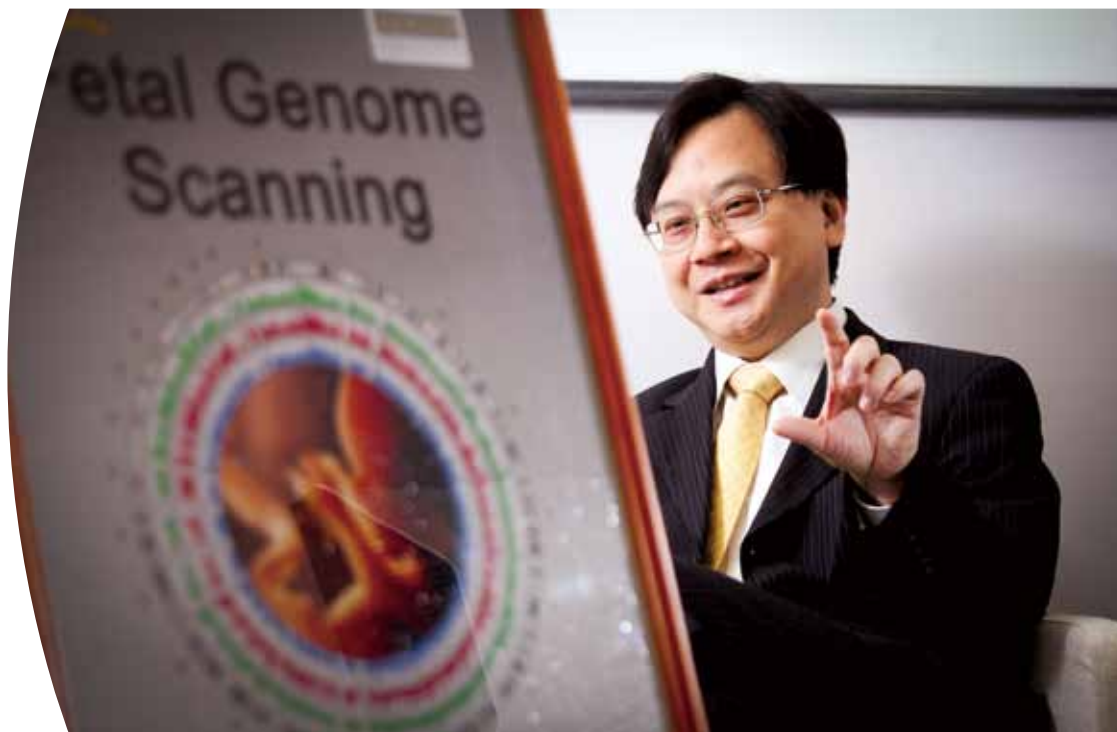
Does every manufacturer need to jump aboard the RFID bandwagon?

Manufacturers of products which consist of many different procedures and parts, for example, a mobile phone, would probably find better use of RFID than, say, a furniture manufacturer. However, in the long run, if a manufacturer wishes to stay competitive, "do nothing" is not an option because her very survival depends on meeting clients' just-in-time inventory policy.

Manufacturers can approach the local branch of GS1 (www.gs1hk.org), a not-for-profit industry led supply chain standards organization where various information and training on supply chain management can be found. Still there are tons of questions to be answered. This is where the Institute can offer assistance. It has launched a pioneering research project to study application of RFID in the garment industry in the first instance. The choice was made as it is an important industry in Hong Kong. Professor Cheung's team is the first team to offer such service to the garment industry. The team aims to expand their study to cover other industries in the near future.

In addition to coordinating and conducting academic and applied research on supply chain management, the Institute develops training courses to spearhead the transfer of much needed know-how to equip manufacturers to cost effectively adopt the RFID technology to help reposition the global competitiveness of Asian manufacturers. The scope of the courses covers the development of infrastructure to manpower training to the capture and analysis of data to enable management to keep abreast of the RFID technology.

為母體中的生命寫真



盧煜明教授

Prof. Dennis Y.M. Lo

中大李嘉誠醫學講座教授和化學病理學講座教授**盧煜明**，少年時代獲父親送贈一台相機，自此迷上攝影，在家裡設置黑房，以光影和色彩的層次捕捉真實的一瞬。像他一樣喜愛攝影的人很多，但很少人像他一樣，能為醫學領域拓土開疆，在該領域的研究前沿佔一席之地。

更安全的產前檢驗

1997年，盧教授發現孕婦血漿含有胎兒的脫氧核糖核酸(DNA)，這項發現令他聲名大噪。他繼而開發出嶄新的唐氏綜合症產前檢測法，避免了傳統入侵式檢測法會導致流產的危險。他開創性的工作促成了新一代無創檢測法的出現。

2010年，他與**趙慧君**教授和**陳君賜**教授合作，首先證明母體血漿含有胎兒的全部基因特質。接下來就是要開發無創的胚胎基因組掃描技術，這是極度困難的事，因為在孕婦血漿DNA中，胎兒的DNA分子只佔十分之一，而且非常零碎。要從這些散落的碎片拼湊出胎兒的基因圖譜，難度不下於完成一個百萬片的拼圖。盧教授說：「更棘手的是，母體血漿內含有大量孕婦本身的DNA分子，胎兒的DNA分子就像這茫茫浩瀚DNA海洋中

的一粟。情況好比拼拼圖時，先摻入另一幅拼圖的千萬片小塊，然後才開始拼合原先的第一幅拼圖。」

小塊拼出眉目

為完成這工作，中大團隊抽取了一名母親的血漿樣本，完成近四十億個DNA分子的排序，約相當於人類基因組的六十五倍。接著，研究團隊拼湊出胎兒分別遺傳自父親和母親的兩組基因圖譜，再把這兩組基因圖譜結合，從而得出胎兒的基因圖譜。在這項試驗中，研究人員利用圖譜檢測出，由於父親的遺傳，胎兒是乙型地中海貧血症基因的攜帶者，但這應該不會在他出生後造成太大影響。

盧教授的團隊利用母體血漿DNA排序技術，能從胎兒的基因圖譜透視各種遺傳特質和基因變異情況。生物醫學權威期刊*Science Translational Medicine*以封面故事發表他們的發現。這項研究的突破在於：只需分析從孕婦身上抽取的一個血液樣本，就能追溯到胎兒的整個基因組，並且只需一次檢測，即能一舉診斷出多種遺傳病。

更全面的癌症測檢

套用照相術語，盧教授現在所做的工作，是以日益細緻清晰的畫面揭開生命的奧秘，以便預防甚至治療疾病；盧教授瞄準當下，為未來尋找答案。最近他更證明類此方法可以用來檢測任何癌症，盧教授在科學上的創舉，照亮了有機會受惠於他的研究的患者的未來。

Genomic Snapshots in Utero

Prof. **Dennis Y.M. Lo**, Li Ka Shing Professor of Medicine and Professor of Chemical Pathology at CUHK, got his first camera from his father and set up a dark room at home when he was an adolescent. He has since been fascinated with the snapshots that capture moments of truth by playing light and darkness or hues of colours. While many would share his interest in photography, few others can claim as trailblazing a status in the world of cutting-edge medical research.

A safer prenatal test

In 1997, Professor Lo made a splash by discovering that the DNA of an unborn fetus could be found in the blood plasma of its pregnant mother. He went on to develop a new method for the prenatal testing of Down syndrome which averted the risk of miscarriage inherent in traditional invasive methods. His pioneering work has made possible a new generation of non-invasive tests.

In 2010, he, in collaboration with Prof. **Rossa Chiu** and Prof. **Allen Chan**, made a breakthrough by showing that the entire fetal genome is represented in maternal plasma. The next step of devising a non-invasive fetal genome scan was challenging, as fetal DNA molecules, which account for only about 10% of the DNA in the maternal plasma, are highly fragmented. Constructing the fetus's genetic profile from these fragments would be tantamount to assembling a million-piece jigsaw puzzle. Professor Lo said, "To make matters worse, these fetal DNA molecules in the mother's blood plasma are drifting in an ocean of maternal DNA molecules. This is like adding in tens of millions of pieces from another jigsaw puzzle and then trying to re-assemble the first one."

The pieces fall into place

To overcome this, the CUHK research team sequenced nearly four billion DNA fragments from a maternal blood sample, which was equivalent to some 65-fold coverage of the human genome. They then constructed separate genetic maps that the fetus had inherited from the father and from the mother. By combining the paternally-inherited and maternally-inherited genetic maps, CUHK researchers were able to arrive at a genomic map of the fetus. They then used this map to confirm that, in the test case in point, the fetus was a carrier of beta-thalassaemia from the father's side, which should not cause any serious postnatal problems.

By carefully sequencing the maternal plasma DNA, Professor Lo's team has been able to reveal the genome-wide genetic and mutational profile of the fetus. Their findings were published as the cover story in the prestigious interdisciplinary biomedical journal, *Science Translational Medicine*. The implication of this ground-breaking research is that by analysing a blood sample from the pregnant woman the entire genome of the fetus can be deduced and screened for many possible genetic disorders in one go.

A comprehensive screener for cancer

What Professor Lo is doing, in photo-technical terms, is to reveal the mystery of life in ever-increasing numbers of pixels which will enhance prevention and even treatment. He takes aim at the present for possible answers to the future. In this regard, he has recently shown a similar approach can be used for detecting virtually any type of cancer. Hence, the future for patients who would benefit from Professor Lo's scientific innovations is indeed bright.



盧煜明教授(前排中)與他的研究團隊

Prof. Dennis Y.M. Lo (centre, front row) and his research team

健康生活由城市規劃開始



吳恩融教授
Prof. Edward Ng

建築學院提供的課程均從人本主義出發，這是創系系主任**李燦輝**教授選擇的路向。建築學院從事的研究，主張為地區建立可持續的環境。現今城市發展的規劃過程中加入了更多科學上的考慮，這便是學院上下努力的成果。

本地問題 國際意義

建築學院有多方面的成就，繪製香港都市氣候圖是其中之一。香港位處亞熱帶地區，人口稠密，市區較炎熱，儘管天然擁有良好的風環境，由於高樓大廈林立，城市人煙稠密，實際上絕少得享微風，結果是產生暑熱壓力和連帶的健康問題。導致生活質素下降，能源消耗量上升。如何把這些主觀感受轉化為客觀參數，讓城市規劃師建設高質素的都市環境？2006年的「都市氣候圖及風環境評估標準可行性研究」，做的正是這項工作。來自不同學科背景及機構的國際團隊，參與了**吳恩融**教授統籌的這項研究。研究以兩項氣候因素為重點，即風和市區熱力控制。

都市氣候圖

多年來，建築學院屢獲香港政府邀請，研究樓宇的照明和通風要求，以及健康與居住環境的關係。這些研究的成果，最終發展為樓宇照明與通風要求的規例和指引。

都市氣候圖研究以上述研究為基礎，搜集科學數據，探討城市結構（包括地形、佈局和建築物）對城市規劃中的風和熱舒適度的影響；並製備都市氣候分析圖和都市氣候規劃建議圖，以便進行策略性規劃，長遠改善市區生活。

研究結果識別了五個都市氣候規劃分區，提出不同的規劃建議；並提出詳盡的規劃和設計措施，以協助項目規劃和制訂發展參數，提高空氣滲透度和降低氣溫，改善都市氣候。這些建議，有助城市規劃師在從事策略性／地區規劃時權衡輕重，既考慮都市氣候因素，也兼顧其他規劃條件。

這項計劃於2013年4月完成，獲得廣泛報道，研究成果在多處發表。研究計劃並榮獲2012年香港規劃師學會週年大獎優異獎。這項「本地」的研究，具有廣泛意義，可應用到世界其他人口稠密的城市。建築學院現在實際上亦肩負城市規劃顧問的重任，曾為中國內地、澳門、新加坡和荷蘭的市政府提供意見。

從研究出發 走進社會

建築學院亦傳授從研究和顧問工作中得到的知識。學院為了讓建造業人士學習有關環保及可持續建築設計的理論與實務，開設了可持續環境設計科學碩士及其他課程，完成了從研究到知識轉移的圓滿過程。



City Planning for Healthy Living

The programmes offered at the School of Architecture adopt a humanistic approach, a path chosen by Prof. **Tunney Lee**, founding chairman of the then Department of Architecture. The research conducted at the School advocates the achievement of a sustainable environment in the region. It has been the result of the work of teachers and researchers of the School that more scientific considerations are now incorporated in the planning process for city development.

A unique local problem with international implications

One of the School's many achievements is the development of the Hong Kong Urban Climatic Map. Hong Kong is a high density city situated in the sub-tropical climate region. It is hotter in the city and, despite our well-endowed wind environment, there is hardly any breeze due to our tall buildings and high density urban environment. The result is poorer living quality because of heat stress and related health problems and increase in energy consumption. How can one translate all these subjective feelings into objective parameters to enable city planners to deliver a higher quality urban environment? The project "Urban Climatic Map and Standards for Wind Environment – Feasibility Study" ("UCM Study") did exactly that in 2006. An international research team from different disciplines and affiliations joined Prof. **Edward Ng Yan-yung** on the UCM Study which focused on two climatic factors, Wind and Urban Thermal Control.

The Urban Climatic Map

Over the years the School had been invited by the Government to study the lighting and ventilation requirements of buildings and then the relationship between health and living environment. Such studies had resulted in regulations and guidelines in lighting and ventilation requirements of buildings.

The UCM Study went further and collated scientific data on the effects of the city fabric, including topography, layout and buildings, on wind and thermal comfort in city planning. The Study further provided an Urban Climatic Analysis Map and an Urban Climatic Planning Recommendation Map to facilitate strategic planning to achieve long-term improvement of urban living.

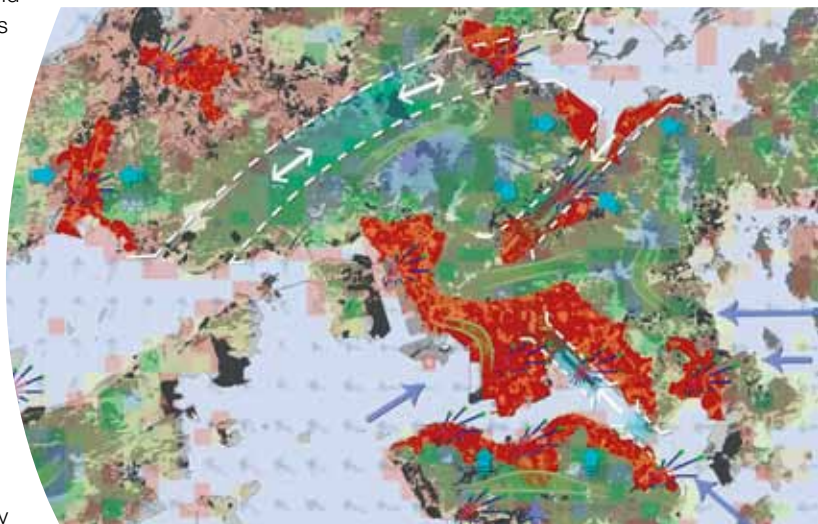
The Study identified five Urban Climatic Planning Zones and different planning recommendations were made. Detailed planning and design measures were also suggested in project planning and formulation of development parameters to improve urban climate by

increasing air permeability and lowering air temperature, such as reducing frontage areas of buildings, controlling building heights and ground coverage and building setback. These will enable city planners to balance urban climatic factors with other planning conditions when making strategic/district plans.

The project was completed in April 2013 and was widely reported and published. It was also awarded the Hong Kong Institute of Planners Awards 2012 — Merit Award. This "local" study has wide implications and can be applied to other densely populated cities in the world. The School is now the *de facto* consultant to governments seeking opinions on city planning and has provided consultancy for municipal governments in China, Macau, Singapore and the Netherlands.

From research to society

The School has also taken steps to pass on the knowledge gained through research and consultancies. It offers an MSc in Sustainable Environmental Design and other programmes, bringing theory and practice in green and sustainable architectural design to stakeholders in the construction and building industry, thus completing the full cycle from research to knowledge transfer.



都市氣候環境圖
Urban Climatic Map

穩定與充實中國的糧食供應



辛世文教授(左)與
林漢明教授(右)
Prof. Samuel S.M. Sun (left) and
Prof. Lam Hon-ming (right)

中國人口龐大，糧食供應備受關注，《The Lancet》(2013年6月8日號)有一篇論文，清楚闡述了中國糧食供應和食物安全的相關問題。其中首列作者與回應作者分別是中大的**林漢明教授**和**辛世文教授**，他們一直致力開展研究，協助中國解決糧食供應的問題。

研種畝產高營養豐的稻米

辛世文教授是中國工程學院院士和農業生物技術國家重點實驗室(香港中文大學夥伴實驗室)前主任，多年來潛心利用基因工程技術改良農作物，為世界提供足夠的糧食，貢獻良多。他指出「糧」字的部首是「米」，可見米的重要；而米更是中國和許多亞洲國家的主要糧食，所以他專研稻米。

辛教授的研究事業發軔於美國，1980年率先複製了首個植物基因，奠下生物技術的發展里程；其後繼續鑽研農業生物技術，1996年回母校中文大學，出掌生物系。

辛教授與「雜交水稻之父」**袁隆平**教授合作，在中國研究產量更高、營養更豐富的雜交水稻。他們育種的雜交水稻含甜玉米基因，光合速率較佳，畝產亦可望提高；該水稻現於

中國接受進一步改良和評估。在國際合作方面，辛教授獲比爾及梅琳達·蓋茨基金會支持，與許多國家的研究員合力研發營養豐富的稻米，中大研究小組負責提高稻米的蛋白質品質，尤其稻米的重要氨基酸——賴氨酸——的含量。該項研究已經完成，正於中國進行食物安全測試。

大豆回家

大豆是中國另一種重要糧食，可提供人體所需的蛋白質和食用油。儘管大豆源自中國，中國現在所需要的大豆，卻有七成需從美國和拉丁美洲進口。前述國家重點實驗室副主任林漢明教授，早已在中國邊緣地區開展研究，開發能在逆境生長的大豆育成品種。他結合先進的生物技術和傳統的育種方法，克服農耕難題。

2009年，林教授和辛教授以及深圳華大基因研究所合作，研究野生大豆的基因組，重組大豆在人工栽培馴化過程中流失的基因資料。他們破解了十七個野生大豆和十四個培植大豆品種的基因組密碼，揭示了兩者之間的基因組差異。研究結果已以封面故事形式發表於2010年12月號的*Nature Genetics*。林教授的研究小組繼續探討大豆基因，在野生大豆基因組中挖掘到耐鹽基因，並已在中國西北乾旱區和華北鹽鹼地培植及測試抗旱耐鹽的大豆品系。

辛教授和林教授努力不懈，充分彰顯了香港植物學家以確保中國糧食供應穩定充裕為己任。

Stabilizing and Strengthening Food Supply in China

The threat to a steady food supply in China is real due to her huge population. The issues concerning food supply and safety in China are clearly articulated in a review published in *The Lancet* (8 June 2013). The first author and the corresponding author, Prof. **Lam Hon-ming** and Prof. **Samuel S.M. Sun** respectively, have devoted the main focus of their research to solving the food supply problem in China.

More nutritious rice with high yield

Professor Sun, Member of the Chinese Academy of Engineering and former Director of the State Key Laboratory of Agrobiotechnology (Partner Laboratory at CUHK), has always aspired to make contributions towards providing the world with adequate food supply through genetic engineering and plant improvement. When asked why focused on rice, he pointed out that the Chinese character for “rice” (米) is embedded in the Chinese character for “food” (糧). Rice is after all a staple food for the Chinese and many other Asian populations.

Professor Sun started his research career in the US. In 1980, he cloned the first plant gene thus leaving his first footprint in biotechnology. Armed with the knowledge he gained in agrobiotechnology, he returned to CUHK in 1996 to head its Department of Biology.

Professor Sun worked with Prof. **Yuan Longping**, the famous “father of hybrid rice” in China, to develop hybrid rice with improved yield and nutrients. The hybrid rice that contained genes of sweet corn has better photosynthetic rate and shows potential yield enhancement. It is now being further improved and evaluated in China. On the international front, Professor Sun joined a consortium of researchers from various countries supported by the Bill and Melinda Gates Foundation for a nutrient-rich rice. The CUHK team’s role in the project is to enhance the protein quality, especially the essential amino acid lysine content in rice. The project has been completed and is currently undergoing food safety testing in China.

The homecoming of soybeans

Another important food for the Chinese is soybean, which provides the protein and oil needed by human beings. Although soybean was originally from China, China needs to import over 70% of her soybean from the US and Latin America to satisfy domestic demands. Professor Lam, Deputy Director of the aforesaid state key laboratory, has chosen to work in marginal regions in China to develop suitable soybean cultivars that can grow under strenuous conditions. His research tries to leverage on state-of-the-art biotechnology and traditional breeding to tackle agricultural problems.

In 2009, Professor Lam collaborated with Professor Sun and BGI-Shenzhen to study the genomes of wild soybeans for restoring genomic information lost during domestication. They successfully decoded the genomes of 17 wild and 14 cultivated soybean accessions and revealed their differences. The findings were published as the cover story in the December 2010 issue of *Nature Genetics*, a top journal in genetics. Professor Lam’s team went on to construct unique genetic materials and identify a major salinity tolerance locus in the wild soybean genome. Field tests on anti-drought and anti-saline soybean lines have already been carried out in marginal regions in Northwestern and Northeastern China.

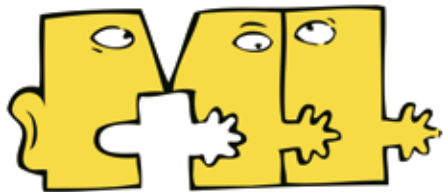
Together, Professor Sun and Professor Lam exemplify the sense of mission of Hong Kong plant scientists in ensuring a stable and sustainable food supply in China.



大豆的生物多樣性 (照片由林漢明教授提供)

Biodiversity of soybeans (photo from Prof. Lam Hon-ming)

手語：健聽者與失聰者之間的橋樑



手語及聾人研究中心的標誌，正好形象地表達鄧慧蘭教授研究手語的宗旨。標誌裏的面部表情，說明手語可以作為健聽者與失聰者之間的橋樑。

中大於James Woodward教授加入後，由1993年起展開手語的研究和培訓工作。Woodward教授是音韻學家，鄧教授的專業訓練則是語言學和第二語言的學習。鄧教授說：「Woodward教授認為手語有一套音韻系統，可以像任何其他語言一樣學習。這挑戰了我一貫的想法。」

手語語言學研究與失聰者培訓

兩位教授結果一起合作，記錄香港手語的種類。2003年，他們再度合作，成立手語及聾人研究中心，並設計亞太區手語語言學研究及培訓計劃。手語及聾人研究中心是首個向亞洲失聰者及健聽研究生教授手語語言學的地方，現已成為這學科在亞洲的核心。中心有多項研究成果，包括亞洲手語庫，以及亞太區各類別手語的字典及教材。

鄧教授指出：「當時(今天亦如是)最大的障礙，是人們對手語和失聰者的誤解。」中心自成立以來，透過研究和公眾教育，成功加深人們瞭解手語語言學培訓的重要性，以及手語語言學對香港和亞洲失聰人士教育的影響。

建立失聰者教育的包容性

失聰的孩子，往往學業成績欠佳、溝通技巧不足、社交有障礙、情緒不穩定。2006年，鄧教授開展為期七年的「賽馬會手語雙語共融教育計劃」，以抗衡香港失聰者教育一直以來只著重口語的教學方法。



鄧慧蘭教授

Prof. Gladys Tang

這項共融教育計劃讓失聰和健聽的兒童在普通學校的課堂一起上課，由健聽老師以口語任教，同時由失聰老師以香港手語授課。所有相關人士，不論健聽或失聰，均對這項計劃推崇備至。計劃還獲聯合國教科文組織國際教育局納入傑出融合教育例子資料庫。這項教育計劃顯示失聰兒童有手語口語兼擅的能力，而學習手語不僅不會妨礙口語方面的發展，反而對學習口語有所助益。手語也有助雙向溝通，亦可讓健聽兒童自由選擇語言。

無障礙世界 從教育平權開始

由於溝通的問題，失聰學生的教育一直以來都受到很大限制。手語語言學的研究，為這些學生帶來了機會。鄧教授希望失聰兒童藉著同時掌握手語和口語，可以學習主流課程，毫無障礙地與健聽人士溝通。

Sign Language: A Link between the Hearing and the Deaf Worlds



聾健學生攜手演出《無聲呼喊》音樂劇，把手語雙語教學模式搬上舞台

A Cry of Silence, musical performance by deaf and hearing students

The philosophy of Prof. **Gladys Tang**'s research in sign language is readily symbolized by the logo of the Centre for Sign Linguistics and Deaf Studies (CSLDS). The stylized faces represent how sign language can be used as the link between the hearing and the deaf worlds.

Sign language research and training started in 1993 at CUHK after Prof. **James Woodward** joined the University. Professor Woodward is a phonologist while Professor Tang's training is in linguistics and second language acquisition. "I was intellectually challenged by Professor Woodward's claim that sign language has a phonological system that can be studied just like any natural language," said Professor Tang.

Sign linguistics research and deaf training

The two professors eventually teamed up to document the varieties of Hong Kong Sign Language ('HKSL'). In 2003, they met again to establish CSLDS and to develop The Asia Pacific Sign Linguistics Research and Training Programme. CSLDS is the first research center and now the hub in Asia that offers training in sign linguistics for Asian deaf individuals and hearing postgraduate students. The research conducted at CSLD delivered, inter alia, the Asian SignBank, as well as dictionaries and teaching materials of the sign language varieties in the Asia-Pacific Region.

Professor Tang says, "The main hurdle back then was (and still is!) the myths and misconceptions surrounding sign language and deaf people." Since its inception, CSLDS has been very successful in raising awareness of the importance of sign linguistics training and its impact on deaf education in Hong Kong and Asia through research findings and public education.

Nurturing inclusiveness in deaf education

Deafness in children often results in academic failure, poor communication skills and social-emotional instabilities. In

2006, Professor Tang embarked on the seven-year "Jockey Club Sign Bilingualism and Co-enrolment in Deaf Education Programme" to counteract the oralist-only approach in deaf education in Hong Kong.

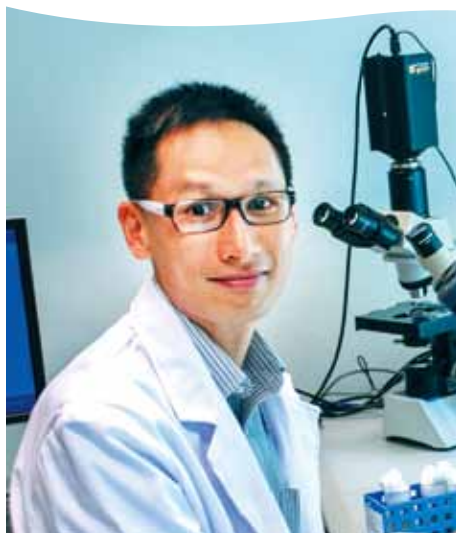
The Programme involves both deaf and hearing children to receive education in a regular classroom, taught by a hearing teacher using speech and a deaf teacher using HKSL. The Programme has won high acclaim from all stakeholders, hearing and deaf. It has been incorporated by UNSECO's International Bureau of Education into their database of good practices for inclusive education. The Programme shows that deaf children can become sign bilingual, and learning a sign language does not impede but facilitates spoken language development. It also enables bilateral communication and offers the flexibility of language choice to hearing students.

Barrier free world starts with equality for all in education

Education for deaf students has always been highly restrictive due to problems of communication. Sign linguistics research opens a window of opportunities for these students. Professor Tang hopes that, with bilingual competency in a sign language and a spoken language, deaf children can access a regular curriculum and communicate with hearing people.

各擅勝場的中大學人

The Manifold Expertise of CUHK Scholars



陳浩然教授
Prof. Edwin H.Y. Chan
 生命科學學院
 School of Life Sciences
 小腦萎縮症尋根
 Tracking Spinocerebellar Ataxias



陳竟明教授
Prof. Chan King-ming
 生命科學學院
 School of Life Sciences
 海洋生態及水質監察
 Marine life and water quality monitoring

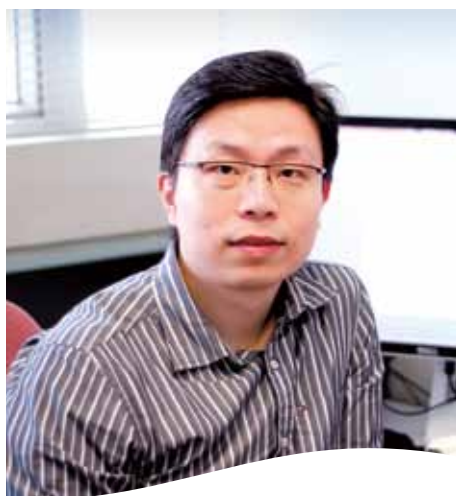


陳麗雲教授
Prof. Chan Lai-wan
 計算機科學與工程學系
 Department of Computer Science and Engineering
 人工神經網絡
 Artificial neural network

賈佳亞教授
Prof. Jia Jiaya
 計算機科學與工程學系
 Department of Computer Science and Engineering
 影像去模糊軟件
 Image deblurring software

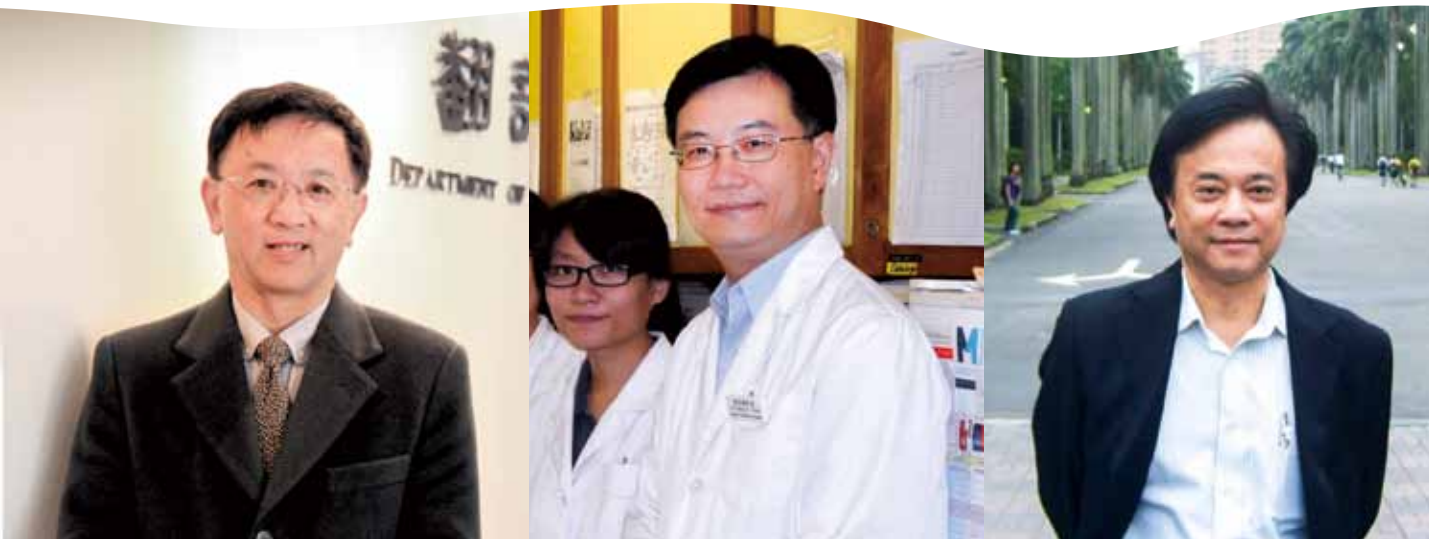
梁秉中教授
Prof. Leung Ping-chung
 矯形外科及創傷學系
 Department of Orthopaedics and Traumatology
 以中藥治療糖尿病
 Chinese herbs to cure diabetic foot

Prof. Catherine A. McBride
 心理學系
 Department of Psychology
 兒童語言及閱讀能力的發展
 Language and reading development in children



優秀研究人員在為基本問題尋找答案之餘，往往還會為往後的科學探索播下種子。有時候種子還會在更廣大的土壤裡扎根發芽，影響平民大眾的生活。各擅勝場的中大學人，造就了大學兼修並蓄的學術風貌和蓬勃多元的研究活動。以下網頁羅列了更多中大的特色研究，恕亦未能盡錄。www.iso.cuhk.edu.hk/chi/research/。

Very often, what a leading researcher does not only finds answers to the basic questions but also seeds the ensuing scientific enquiries. Under some circumstances, the seed may even take root on broader grounds to impact on the lives of the common folk. It is the manifold expertise of CUHK scholars that distinguishes CUHK as a comprehensive and vibrant research community. By no means exhaustive, more of these pursuits can be found at: www.iso.cuhk.edu.hk/eng/research/.



陳善偉教授
Prof. Chan Sin-wai
翻譯系
Department of Translation
電腦輔助翻譯
Computer-aided translation

陳活彝教授
Prof. Chan Wood-ye
生物醫學學院
School of Biomedical Sciences
解開先天性巨結腸之迷
Solving the mystery of congenital megacolon

張越華教授
Prof. Cheung Yuet-wah
社會學系
Department of Sociology
濫藥及毒品政策研究
Substance abuse and drug policy

黃家星教授
Prof. Lawrence K.S. Wong
內科及藥物治療學系
Department of Medicine and Therapeutics
為中風病人帶來希望
Bringing hope to stroke patients

張立教授
Prof. Zhang Li
機械與自動化工程學系
Department of Mechanical and Automation Engineering
游走人體的微型機械
Microrobotic transporter inside the body

徐仲鏞教授
Prof. Benny C.Y. Zee
賽馬會公共衛生及基層醫療學院
The Jockey Club School of Public Health and Primary Care
評估腦血管及中風風險的系統
Automatic diagnosis for cerebral vessel conditions and stroke risk





輝煌成就

Stellar Achievements

諾貝爾獎得主 Nobel Laureates	4
菲爾茲獎得主 Fields Medalist	1
沃爾夫數學獎得主 Wolf Prize Laureate in Mathematics	1
圖靈獎得主 Turing Award Winner	1
電機及電子工程師學會院士 IEEE Fellows	30
中國科學院院士 Academicians of the Chinese Academy of Sciences	6
中國科學院外籍院士 Foreign Academicians of the Chinese Academy of Sciences	4
中國工程院院士 Academicians of the Chinese Academy of Engineering	3
中央研究院院士 Academicians of Academia Sinica	8
國家自然科學獎得主 Winners of the State Natural Science Award	15
裘槎基金會優秀科學者 Awardees of the Croucher Senior Research Fellowship	15
裘槎基金會優秀醫學科學者 Awardees of the Croucher Senior Medical Research Fellowship	6
美國物理學會院士 Fellows of the American Physical Society	5
計量經濟學會院士 Fellows of the Econometric Society	2
計算機器學會院士 Fellows of the Association for Computing Machinery	4
美國國家工程學院院士 Members of the US National Academy of Engineering	2
長江學者成就獎得主 Winners of the Cheung Kong Achievement Award	3
教育部高等學校科學研究優秀成果獎(科學技術)得主 Winners of the Ministry of Education Outstanding Scientific Research Output Award	27
皇家學會院士 Fellows of the Royal Society	2

截至2013年6月30日
For the year ended 30 June 2013

五大重點 研究領域 Five Focused Areas of Research

中文大學在許多教研領域中取得傑出成就。教學人員致力學術研究，其成果不單在國際學術界備受推崇，更在亞洲以至全球產生深遠影響。在2006年制訂的策略計劃中，中文大學從現有的研究領域選出五個發展重點，並調配充足資源協助其開展研究。

CUHK has distinguished itself in many aspects of teaching and research. Academic staff engage in scholarly inquiry of world-class standard which has led to findings of regional and global impact. The University also strives to complement this breadth of scholarship with focus on a number of selected areas. In its Strategic Plan 2006, five key areas have been identified for strategic research investment.



中國在國際經濟、文化、政治舞台的地位日益重要，跨學科的中國研究，也逐漸變成理解所有中國事物的基礎。

入門網站

- 中國現代文學研究網

卓越學科領域

- 中國社會的歷史人類學研究

相關網站

- 中國文化研究所
- 中國研究服務中心
- 香港亞太研究所
- 亞太工商研究所
- 中國研究中心
- 文學院
- 社會科學院
- 香港中文大學—蔣經國基金會亞太漢學中心

As China takes centre stage in the world's economic, cultural and political arenas, the bilingual and multi-disciplinary field of Chinese Studies becomes an international hub of teaching and research on China and an essential source of understanding for all things Chinese.

Portal

- Modern Chinese Literature Research Portal

Areas of Excellence

- The Historical Anthropology of Chinese Society

Related Websites

- Institute of Chinese Studies
- Universities Service Centre for China Studies
- Hong Kong Institute of Asia-Pacific Studies
- The Asia-Pacific Institute of Business
- Centre for China Studies
- Faculty of Arts
- Faculty of Social Science
- CUHK-CCK Foundation Asia-Pacific Centre for Chinese Studies



中文大學的生物醫學研究跨越了傳統的學術範疇，從微小的分子單位出發，廣涉社會、公共衛生、生物科學等不同層面的健康課題。

卓越學科領域

- 母體血漿胎兒核酸研究中心
- 中醫中藥研究與發展
- 植物及農業生物科技中心

相關網站

- 中醫中藥研究所
- 植物分子生物學及農業生物科技研究所
- 李嘉誠健康科學研究所
- 生物醫學學院
- 華南腫瘤學國家重點實驗室（香港中文大學夥伴實驗室）
- 賽馬會公共衛生及基層醫療學院

Biomedical research in CUHK straddles the conventional boundaries of academic disciplines and addresses health issues from the molecular to the societal level, contributing to progresses in medicine, public health, and bioscience.

Areas of Excellence

- Centre for Research into Circulating Fetal Nucleic Acids
- Chinese Medicine Research and Further Development
- Centre for Plant and Agricultural Biotechnology

Related Websites

- Institute of Chinese Medicine
- Institute of Plant Molecular Biology and Agricultural Biotechnology
- Li Ka Shing Institute of Health Sciences
- School of Biomedical Sciences
- State Key Laboratory of Oncology in South China (Partner Laboratory in The Chinese University of Hong Kong)
- The Jockey Club School of Public Health and Primary Care



信息科學 Information Sciences

中文大學對信息科學的發展影響深廣，是區內的重點互聯網樞紐。我們將繼續往開來，創造和傳播信息科學的新知，為該學科的研究方向、業界和社會帶來深遠影響。

卓越學科領域

- 網絡編碼研究所
- 資訊科技

相關網站

- 信興高等工程研究所
- 香港中文大學利群計算及界面科技教育部—微軟重點實驗室
- 理論計算機科學與通訊科學研究所

On the basis of its significant presence in Information Sciences, itself being a major internet hub for the region, CUHK will continue to create and disseminate cutting-edge knowledge and technologies that have profound impact on the academia, the industry, and the society.

Areas of Excellence

- Institute of Network Coding
- Information Technology

Related Websites

- Shun Hing Institute of Advanced Engineering
- CUHK MoE-Microsoft Key Laboratory of Human-Centric Computing and Interface Technologies
- Institute of Theoretical Computer Science and Communications



經濟與金融 Economics and Finance

中文大學在探討經濟與金融方面，於亞洲處領先地位。中大利用這一優勢成立了經濟金融研究所。該所以中國經濟、企業財務及中國和亞洲新興金融市場等為研究重點。

相關網站

- 經濟及金融研究所

Economics and Finance builds on the existing strengths of CUHK as a leading Asian institution to strategically develop the Institute of Economics and Finance. The focus of the Institute will be the Chinese economy and corporate finance and the emerging financial markets of China and Asia.

Related Website

- Institute of Economics and Finance



地球信息與地球科學 Geoinformation and Earth Sciences

太空與地球信息科學研究所是香港唯一的國家級衛星遙感基地。由該所建議設立的熱帶季風環境遙感實驗室，更是一所創新突破、科技尖新的地球信息與地球科學綜合實驗室。該實驗室的發展方向是推行教育、從事前沿研究、以科學解決問題，並提供技術轉移，藉此提升區內人們生活品質、改善環境和推動經濟發展。

相關網站

- 太空與地球信息科學研究所

The Institute of Space and Earth Information Science (ISEIS) is the only national base for satellite remote sensing in Hong Kong. The Institute's major initiative, a Laboratory for Tropical Monsoon Environmental Remote Sensing, is a groundbreaking, state-of-the-art, comprehensive laboratory in Geoinformation and Earth Science. The strategic development of this Laboratory through education, cutting-edge research, providing scientific solutions, and technology transfer will greatly assist in the enhancement of life, the environment, and the economy in the region.

Related Website


- Institute of Space and Earth Information Science

中大卓越學科領域

CUHK Areas of Excellence Projects

大學教育資助委員會自1999年起推出「卓越學科領域計劃」，向香港大專院校提供專項研究資助，迄今已批出六輪撥款，共選定了十八個項目，其中由中文大學研究人員領導者佔七項。

The Areas of Excellence Scheme was launched by the University Grants Committee in 1999 to provide funding for research projects to tertiary institutions in Hong Kong. Six rounds of Areas of Excellence exercise have been undertaken and 18 projects have been selected for the grant, of which seven are led by researchers of CUHK.



資訊科技

撥款：5,100萬港元

暫定研究時限：2000年至2005年


本項目的目標是使香港成為國際資訊科技領域中的重要一員，從而帶動香港轉型為資訊科技社會，發展高增值的經濟體系。項目有三個研究範疇，分別為現已作商業應用的異類網絡的多媒體資訊傳送、互聯網上分散式阻斷攻擊，以及互聯網技術。各範疇均成果豐碩，研究員亦在國際權威性學術期刊和會議上發表了二百一十份論文與研究報告，深化了跨院校的合作，亦加強了本地研究員與國際頂尖學者的聯繫。

Information Technology

Funding approved: HK\$51M

Indicative project time-frame: 2000–2005

The project aimed to put Hong Kong on the world map as one of the key players in information technology, thereby contributing to the transformation of Hong Kong into an information technology society with a strong value-added economy. The project focused on three areas: multimedia delivery over heterogeneous networks, which has now been applied commercially; distributed denial of service attack on the internet; and internet technology. Large quantities of high quality output have been produced. The research team contributed a total of 210 papers to prestigious international journals and conferences, and has strengthened inter-institutional collaborations and connections with well-known researchers around the world.



植物及農業生物科技中心

撥款：6,382萬港元

暫定研究時限：2000年至2011年

糧食短缺是全球發展中國家急須解決的問題。本項目的目的是利用嶄新生物科技，增加農作物產量，以及改善其品質，如提升營養和增加抗逆性。研究小組更嘗試於作物植物中生產增值產品。項目的策略是建立生產生物科技作物的渠道，由珍貴種質資源中鑑別有用基因，再轉化這些基因入目標作物（如水稻），以培養出新品種，經田間試驗及安全測試後，生產新農作物父母本供農業生產之用。

Centre for Plant and Agricultural Biotechnology

Funding approved: HK\$63.82M

Indicative project time-frame: 2000–2011

Food shortage is a pressing problem in developing countries around the world. It was the mission of this project to increase crop production and enhance quality (by, for example, improving nutritional value and increasing stress tolerance) through biotechnology. The project team also attempted to generate value-added products from crop plants. The strategy of the project was to build a pipeline for biotechnology crop production by identifying useful genes from elite germplasms, transferring those genes into designated crops (e.g., rice) to produce new lines, conducting field trials and safety assessment, and finally delivering a set of parental lines for agricultural production.

中醫中藥研究與發展

撥款：3,299萬港元

暫定研究時限：2001年至2011年

本項目旨在推動中醫中藥研究的現代化，採取以療效為基礎的中醫藥科學驗證模式，為多類西方醫學仍未能徹底治療或預防的疾病尋找互補或另類療法。目前已有五條草配方的臨床療效、作用機理和應用安全獲得驗證。本項目將深入研究針對糖尿病足癒合和心血管保健的配方，研究成果除了可為選定的配方作臨床療效證明外，亦會制定中藥臨床研究與藥物鑑證的模式，為藥物開發及中藥商品化作好準備。

母體血漿胎兒核酸研究中心

撥款：3,128萬港元

暫定研究時限：2008年至2015年

產前診斷是不可或缺的產科醫療服務，但現今羊膜穿刺術之類的方法則具創傷性，對胎兒可能有不良影響。本項目的統籌隊伍於1997年首次發現孕婦的血漿內存有胎兒的脫氧核糖核酸，由此開啟了無創產前診斷，此方法現時亦已為全球各地採用。本項目在中大統籌下，由本港和國際科研人員合作，探討多個極受關注的問題，例如唐氏綜合症的無創產前診斷，為全世界帶來安全的產前診斷服務。

網絡編碼研究所

撥款：8,027萬港元

暫定研究時限：2010年至2017年

數據經計算機網絡傳輸時均以儲存和轉送模式進行，但路由節點不會改變這些數據。本項目的研究團隊十多年前已提出網絡編碼的基本概念，即數據在傳輸過程中可作合併和加以處理，網絡通訊（如互聯網）亦因而得以更有效可靠，也更穩定安全。本項目建立頂尖的網絡編碼研究所，進行的尖端研究包括網絡編碼理論及其在互聯網、無線通訊、信息安全、數據存儲和生物信息等範圍的應用。

Chinese Medicine Research and Further Development

Funding approved: HK\$32.99M

Indicative project time-frame: 2001–2011

The objective of the project was to promote the modernization of Chinese medicine. The efficacy driven approach was adopted to establish an evidence-based scientific model for Chinese medicine research, with a view to identifying complementary or alternative treatments for clinical problems that were not adequately solved by modern medicine. Five selected herbal formulae had been fully explored for their clinical efficacies, underlying mechanisms of action and safe applications. The project further studied two formulae for promoting ulcer healing and cardiovascular health. It not only gathered clinical evidence of the efficacy of selected herbal formulae, but also established models for clinical trials and drug authentication for Chinese medicine, thereby paving the way for drug development and commercialization.

Centre for Research into Circulating Fetal Nucleic Acids

Funding approved: HK\$31.28M

Indicative project time-frame: 2008–2015

Prenatal diagnosis is an indispensable component of maternity health care. Definitive diagnostic methods in current use, e.g., amniocentesis, are invasive and pose a risk to the unborn child. In 1997, the project coordinator and his research team discovered, for the first time, the presence of fetal DNA in the plasma of pregnant women, offering new possibilities for non-invasive prenatal diagnosis. This method is now used globally. The Center, as a conglomerate of local and international researchers coordinated by CUHK, addresses a number of high-profile unsolved questions, including non-invasive molecular methods for the diagnosis of fetal Down syndrome. The ultimate goal is to make safe prenatal diagnosis available around the world.

Institute of Network Coding

Funding approved: HK\$80.27M

Indicative project time-frame: 2010–2017

The paradigm for data transmission through a computer network has long been *store-and-forward*. An intermediate node in routing does not alter the data being forwarded. Over a decade ago, the project team introduced the fundamental concept of Network Coding, allowing for the combination and processing of data along the way, making network communications (e.g., the Internet) more efficient, reliable, robust and secure. This project builds the world-leading Institute of Network Coding to conduct cutting-edge research on the theory of Network Coding and its various applications on the Internet, in wireless communications, information security, data storage, and bioinformatics.

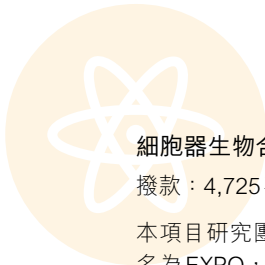


中國社會的歷史人類學研究

撥款：2,344.7萬港元

暫定研究期限：2010年至2017年

本項目以跨學科的歷史人類學方法研究中國歷史，結合田野和文獻研究，探討中國各地社會過去一千年來的歧異。中國歷朝雖天下一統，社會和文化的轉變卻因地而異，亦各有發展，相同之處則與各地歸於統一的先後，以及當時政府的相對措施有關。本項目在中國十五個地理區域進行研究，分析各地社會如何保存其本土特色和融入大一統文化。研究隊會記錄當地的禮儀習俗，以了解社會制度的演變。



細胞器生物合成及功能研究中心

撥款：4,725萬港元

本項目研究團隊最先發現一類新細胞器，命名為EXPO，革新了植物蛋白質分泌的研究概念。EXPO主要調節一種從未被發現的蛋白質分泌途徑，其潛在功能之一是釋放抗菌劑至植物表面，以抵禦細菌、病毒和外來傳染物入侵。所有植物均有這種非常規蛋白質分泌，但卻少為人知，若能了解其功能和傳輸途徑，當有助推展生物燃料與植物生物技術的研究。本項目對本港和內地生物技術產業的發展有極大潛在應用價值。

The Historical Anthropology of Chinese Society

Funding approved: HK\$23.447M

Indicative project time-frame: 2010–2017

This project adopts the multi-disciplinary approach of historical anthropology to study Chinese history. Drawing on historical documents and field research, the project looks into regional variations in China over the past 1,000 years. While different parts of China are unified under the Chinese state, many social and cultural changes had evolved locally and independently. Meanwhile, similarities may be related to the history of the incorporation of different geographical areas into the Chinese state and the administrative arrangements by which they were incorporated. This project studies 15 geographic areas in China to recover the history of both how a local society acquires and identifies with its own characteristics, and how it is incorporated into, and accepted, the broad expanse of a unified culture. The project team documents local ritual traditions and reconstructs the history of the local institutions in which they were employed.

Centre for Organelle Biogenesis and Function

Funding approved: HK\$47.25M

The project team discovered a novel organelle termed EXPO (Exocyst-positive Organelle), introducing a new concept into the study of protein secretion in plants. EXPO mediates an unconventional protein secretion. One of its potential functions is to release antibiotics to the surface of the plant to resist bacteria, viruses and contagion. This hitherto unknown unconventional protein secretion exists in all plants. An understanding of its functions and channels of communication will benefit the study of biofuel and biotechnology. The project will have potential applications for the biotechnology industry in Hong Kong and China.

中大國家重點實驗室

CUHK State Key Laboratories

「國家重點實驗室計劃」是中國國家科技創新體系的重要環節，於1990年代初推出，由中國科學技術部負責，組織高水平的基礎研究和應用基礎研究，是凝聚和培養優秀科學家，以及開展高層次學術交流的平台。重點實驗室主要附設於中國科學院的研究所或全國重點大學，設於中文大學的有五所。

The State Key Laboratory (SKL) Scheme is an important component of the national innovation system in China. It was launched in the early 1990s under the purview of the Ministry of Science and Technology of China. The Scheme coordinates high quality infrastructural research and applied infrastructural research, draws together and nurtures accomplished scientists, and serves as a platform for high level academic exchange. SKLs are mainly attached to the research institutes of the Chinese Academy of Sciences or key universities all over China. There are five SKLs set up in CUHK.

華南腫瘤學國家重點實驗室 (香港中文大學夥伴實驗室)

實驗室設於沙田威爾斯親王醫院包玉剛癌症中心，以中文大學與中山大學在癌症研究上的多年合作為基礎，香港的醫院管理局和食物及衛生局則一直提供大量臨床病例以供研究。本地研究和治療癌症已有相當時間，中大於1990年即成立香港癌症研究所。實驗室匯聚了中太和中山大學不同學科的人員，都是臨床專家和基礎癌症研究的專才，研究範圍為區內常見的癌症，尤其是鼻咽癌、肝癌和胃癌，以研究其分子基因和信號傳遞途徑為主，目標是作臨床診斷和開發新治療方法。實驗室現時與全球二十多個頂級癌症研究中心合作，包括美國德薩斯大學安德遜癌症中心、明尼蘇達州的Mayo Clinic、約翰霍普金斯大學、英國牛津大學，以及中國復旦大學和北京大學的相關單位。

State Key Laboratory of Oncology in South China (Partner Laboratory in The Chinese University of Hong Kong)

Located at the Sir Y K Pao Centre for Cancer of the Prince of Wales Hospital, the State Key Laboratory of Oncology in South China (Partner Laboratory in The Chinese University of Hong Kong) is built on the solid foundation of CUHK's long-established partnership with Sun Yat-sen University in cancer research and the backing of a strong clinical base and support of the Hospital Authority and the Food and Health Bureau of Hong Kong. Besides, there is a long tradition of cancer research and care in the local community. CUHK's Hong Kong Cancer Institute was established in 1990. The investigators of the SKL are a multi-disciplinary group of clinical and basic cancer researchers from CUHK and Sun Yat-sen University, who have conducted research investigating the molecular genetics, signalling pathways, clinical diagnostics and novel therapeutic developments of cancers common in the region, in particular nasopharyngeal cancer, liver cancer and gastric cancer. The SKL has entered into collaborations with over 20 top cancer centres in the world, including MD Anderson of Texas University, Mayo Clinic in Minnesota and Johns Hopkins University of the US, Oxford University of the UK, and Fudan University and Peking University of China.

農業生物技術國家重點實驗室 (香港中文大學夥伴實驗室)

實驗室以中文大學和中國農業大學的合作為基礎，目標是發展分子生物技術，以增加大米和其他農作物的產量，並改善這些農產的營養價值及確保食物安全，以紓緩糧食供應緊張的問題。實驗室把香港的國際網絡、國際人才和管理制度這些優勢，與國內的龐大經濟力量、優秀科研隊伍和豐富天然資源結合，融會現代科技和傳統經驗，藉開發新技術和培養高質素科研人才，以提升中國農業的技術儲備和生產力。實驗室現進行國際性的深入協作，以策略性互補夥伴合作模式，致力在前沿農業生物科技上取得突破。實驗室的研究主要分農業改良和技術平台兩大範疇，前者有水稻增產與營養改良研究、作物耐逆性與水稻抗病研究，以及動物發育與幹細胞基礎研究；後者則有水稻與大豆轉化系統和種子生物反應器。

State Key Laboratory of Agrobiotechnology (Partner Laboratory at The Chinese University of Hong Kong)

Set up on the foundation of the collaboration between CUHK and China Agricultural University, the SKL aims to relieve food shortage by increasing the yield of rice and other crops, improving their nutritional value and ensuring food safety through the development of molecular biotechnology. The SKL taps into Hong Kong's advantages in global networking, international talent pool and modern management, and the Mainland's strengths in economic power, research capacity and natural resources. Combining modern technology with traditional experience, the SKL enhances the technological reserve and productivity of Chinese agriculture through the development of new technologies and high quality research talent. The SKL is seeking breakthroughs in various frontier research areas in agrobiotechnology through enhanced global collaboration and strategic complementary partnership. Research priorities include crop improvement and technology platform, with the former covering rice yield enhancement and rice nutritional quality improvement, crop stress tolerance and rice disease resistance, and animal developmental and stem cell basic research, and the latter covering indica rice and soybean transformation systems and seeds as bioreactors.

植物化學與西部植物資源 持續利用國家重點實驗室 (香港中文大學夥伴實驗室)

實驗室建基於中文大學中醫中藥研究所與中國科學院昆明植物研究所的多年合作之上，目的是發展有關傳統中醫藥現代化，以及應用生物科技於藥用植物上的研究。中醫中藥研究向為香港中文大學的重點研究領域之一，近年成果優秀，昆明植物研究所植化國家實驗室則是國內研究藥用植物，尤其是中國西部植物資源的先驅，對國內和國外同類研究的發展極具影響力。實驗室將結合中大中醫中藥研究所和昆明植物研究所的優勢，以科學方法驗證中藥的效用和安全性，以及增加中藥在現代醫學上的應用，目標為令中藥更廣為世界各地所接受。實驗室將致力於研究植物化學和中國西部植物資源的持續性，尤其針對癌症治療、心血管健康、保健產品開發、DNA 鑑別和條碼化，及病毒感染等範疇。

State Key Laboratory of Phytochemistry and Plant Resources in West China (Partner Laboratory in The Chinese University of Hong Kong)

Built on the foundation of long-term collaboration between the Institute of Chinese Medicine of CUHK and the Kunming Institute of Botany, Chinese Academy of Sciences, the SKL aims to conduct research into the modernization of traditional Chinese medicine and the application of biotechnology in medical science. The study of Chinese medicine has been one of the key research areas at CUHK, with spectacular results coming up in recent years. The State Laboratory of Phytochemistry of the Kunming Institute of Botany is the pioneer in the study of medicinal plants, in particular plant resources in western China, and has a significant influence on the development of similar researches in China and beyond. Combining the strengths of the two institutes, the SKL is well positioned to enhance international acceptance of traditional Chinese medicinal remedies by providing scientific proof of their efficacy and safety and exploring how such remedies can be more widely applied in modern medicine. Its research will focus on the phytochemistry and sustainability of plant resources in western China, particularly in the areas of cancer treatment, cardiovascular health, development of health supplements, authentication and barcoding of DNA, and viral infection.

State Key Laboratory of Synthetic Chemistry

合成化學國家重點實驗室

實驗室由香港中文大學、香港大學和中國科學院上海有機化學研究所「金屬有機化學國家重點實驗室」合作共同建立，主要研究新穎合成物的設計、合成與應用。實驗室亦致力發展對環境無不良影響的化學合成新方法，以合成對人類社會有貢獻的化合物。實驗室將為本港各大學的跨學科基礎研究提供平台，有助培育研究人才。

State Key Laboratory of Synthetic Chemistry

The SKL of Synthetic Chemistry is established by CUHK in partnership with the University of Hong Kong and the SKL of Organometallic Chemistry of the Shanghai Institute of Organic Chemistry, the Chinese Academy of Sciences. The objective is to study the design, synthesis and application of novel chemical compounds. The SKL also develops new environmentally friendly methods for synthesizing useful chemical compounds. It will provide a platform for multi-disciplinary infrastructural researches among universities in Hong Kong and helps train researchers.

消化疾病研究國家重點實驗室 (香港中文大學夥伴實驗室)

新近成立的消化疾病研究國家重點實驗室(香港中文大學夥伴實驗室)，是中大第五所國家重點實驗室，獲中國國家科學技術部批准成立，由中大與第四軍醫大學聯合建設。透過此實驗室，中大與第四軍醫大學加強在消化疾病研究的合作關係，集中研究中國人常見的消化道腫瘤以及消化道潰瘍出血、慢性肝病、炎症性腸病等消化病；並進行基礎醫學、轉化醫學和臨床應用等方面的廣泛深入研究。消化疾病研究國家重點實驗室的建立，進一步推動及提升中國在消化病學研究方面的地位，提高消化道腫瘤和其他消化道疾病診治水平，加強中大在有關領域的國際領先地位。

State Key Laboratory of Digestive Disease (Partner Laboratory in The Chinese University of Hong Kong)

The fifth state key laboratory at CUHK was recently established with the approval of the Ministry of Science and Technology in partnership with the Fourth Military Medical University (FMMU). The state key laboratory carries out basic, translational and clinical research on the gastrointestinal cancer, peptic ulcer bleeding, chronic liver disease and inflammatory bowel disease. It will enhance China's position in terms of digestive disease research and improve the level of diagnosis and treatment of gastrointestinal cancer and other digestive diseases, as well as further strengthening the University's leadership in related fields.



中國文化研究所 Institute of Chinese Studies



中文大學創校宗旨是「結合傳統與現代，融會中國與西方」，馬料水建校之初，最早期的建築物之一是六十年代末七十年代初落成的中國文化研究所。

中國文化研究所成立於1967年，自此一直是中文大學與海內外學術研究機構在中國研究方面聯繫和合作的橋樑，為大學以及來訪學人提供研究及學術交流各方面的設施和機會。

到了今天，中國文化研究所多個研究中心、課程、刊物、資料庫等，為中國藝術、語言、文學、歷史、考古等範疇的學術研究不可或缺的寶貴資源，令中文大學成為國際稱譽的中國研究重鎮。

研究單位包括：

- 文物館
- 翻譯研究中心
- 中國考古藝術研究中心
- 吳多泰中國語文研究中心
- 當代中國文化研究中心
- 劉殿爵中國古籍研究中心
- 中國研究服務中心

學術刊物包括：

- 《中國文化研究所學報》
- 《譯叢》
- 《中國語文研究》
- 《中國語文通訊》
- 《二十一世紀》
- 《先秦兩漢古籍逐字索引叢刊》
- 《魏晉南北朝古籍逐字索引叢刊》
- 《漢達古籍研究叢書》

The Chinese University was founded with the vision of “combining tradition with modernity and bringing together China and the West”. It is no coincidence that one of the earliest buildings erected on the Ma Liu Shui campus was that of the Institute of Chinese Studies in the late 1960s and early 1970s.

Since its founding in 1967, the Institute has served as an international centre for communication and collaboration with other academic and research institutions in Chinese subjects. It affords the facilities and opportunities of research and academic exchanges to scholars, home and visiting, through publications, conferences, seminars and exhibitions.

Today, the Institute has grown to encompass a spectrum of centres, programmes, publications and databases essential to scholarship and academic pursuits in different fields in Chinese arts, language, literature, history and archaeology. It has made CUHK the forerunner and a premier international hub of Chinese studies.

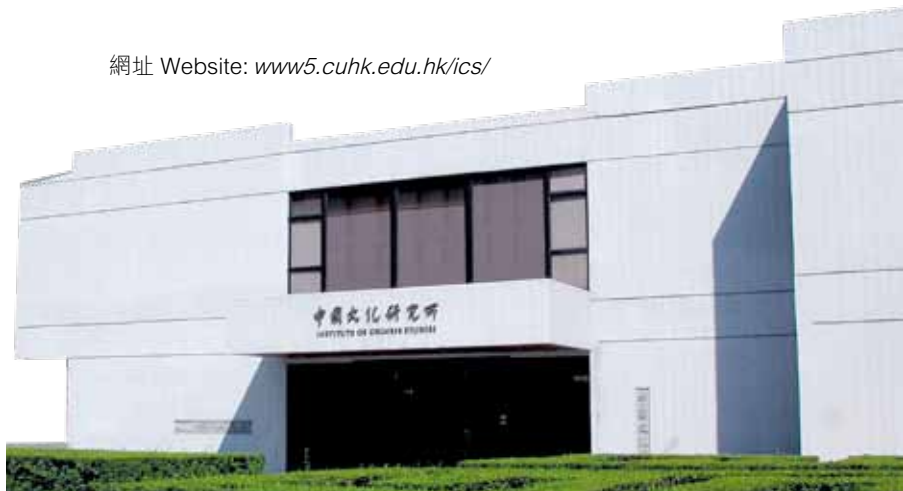
Research units include:

- Arts Museum
- Research Centre for Translation
- Centre for Chinese Archaeology and Art
- T. T. Ng Chinese Language Research Centre
- Research Centre for Contemporary Chinese Culture
- D. C. Lau Research Centre for Chinese Ancient Texts
- Universities Service Centre for China Studies

Publications include:

- *Journal of Chinese Studies*
- *Renditions*
- *Studies in Chinese Linguistics*
- *Newsletter of Chinese Language*
- *Twenty-First Century Bimonthly*
- *The Pre-Han and Han Concordance Series*
- *The Six Dynasties Concordance Series*
- *The CHANT (CHinese ANcient Texts) Series*

網址 Website: www5.cuhk.edu.hk/ics/



深圳研究院 Shenzhen Research Institute



珠三角地區發展蓬勃，對多個範疇的技術及專才需求日增。得深圳市政府支持，中文大學於2007年成立深圳研究院，積極協助解決深圳以至珠三角地區的產業發展和人才培訓的需求。

研究院位處南山區深圳虛擬大學園，樓高九層，建築面積二萬五千平方米，於2011年落成，自此提供足夠地方和先進設備，成為多個培訓和科研項目的基地。

目前，研究院重點開展農業與食品安全、生物技術、互聯網與信息技術、經濟與人文社科四大領域的科研開發和產業化工作。在工程、管理和衛生方面的培訓課程，為深圳以至地區培訓優才，它也是中大與內地機構合作，促進技術轉移的平台。在教育、科研以及產業化層面，深圳研究院都扮演著重要角色。

深圳研究院院長、中大副校長程伯中教授說：「寄望透過深圳研究院，能更充分地利用中文大學的科研力量和教育資源，承擔起大學在內地的延伸機構的責任，為內地科技創新、經濟社會發展和民生福祉貢獻力量。」

The tremendous pace at which the Pearl River Delta region develops means an increasingly large demand for expertise and trained professionals in different disciplines. With support from the Shenzhen Municipal Government, CUHK set up the Shenzhen Research Institute in 2007 to help address that educational and training need in Shenzhen and the region.

Situated in the Shenzhen Virtual University Park in Nanshan District, the Institute's U-shape, 9-storey building with a gross floor area of 25,000 sq. m. was completed in 2011, providing ample spaces and state-of-the-art facilities for its various programmes and projects.

At present, the work of the Institute is focused on four areas: agricultural product and food safety, biotechnology, internet and information technology, and economics and social subjects. Its training programmes in engineering, management and hygiene contribute to the upgrading of human capital in Shenzhen and the region. It is also a platform for CUHK to collaborate with mainland corporations and for the promotion of technology transfer. The Institute has played an important role in education, research and industrialization in Shenzhen and the region.

As its director, Prof. P.C. Ching, Pro-Vice-Chancellor of CUHK, said, "On the basis of the research prowess and educational resources of the Chinese University, the Institute hopes to serve as the University's extension on the mainland to contribute to advances in technological innovation, economic development and social well-being in the region and in the nation."

網址 Website: www.cuhkri.org.cn

知識轉移：大學的第三使命

Knowledge Transfer: the Third Mission of the University



中文大學在不同範疇有蓬勃的知識轉移活動。知識轉移，簡言之是知識的轉化和應用，不囿於科技範疇，凡是對文化價值承傳和生活質素有重要影響的學科如藝術、人文及社會科學等，也絕不能忽略。

中大自成立以來，大學同仁或是承接校外科研學術合約；或是把其發明授權和市場化；或是以自身的專業知識服務社會，這些都是經不同渠道進行的知識轉移。大學同仁皆能意識到他們的專業知識和研究成果不是局限於發表論文，在創造知識之餘，恆有餘力地把知識回饋社會，這便是大學的第三使命。

大學在過去把學術成果貢獻社會的例子包括：崑曲及粵劇的推廣計劃；與各界分享老人防跌、骨折治療和復康經驗；和工程學院創新科技中心為業界提供的技術諮詢服務。

大學在推動知識轉移的努力亦獲教資會的認同，教資會並讚揚中大鼓勵創新和跨學科的知識轉移項目，而各項社區計劃不但加強大學關懷社會的特色，且造福社區，在推動市場化和保障知識產權方面表現出色。

iWE 運動儀
iWE Platform



CUHK has been a pioneer in the promotion of knowledge transfer, which refers to the transfer and application of knowledge to the community. While technology transfer is included, scholarly output from the arts, humanities and social sciences make equally important contributions, specifically to the transmission of humanistic cultural values and improvement in quality of life, and as such should also be shared with the public.

Since the inception of CUHK, staff members of the University have engaged in knowledge transfer activities by undertaking commissioned research, licensing patent rights to corporations for product development, or providing professional advice. They are well aware that their expertise and research findings are not limited to publishing papers. Besides teaching and research, academics share the knowledge they create with the public, and make that the third mission of the University.

The University's past contributions in spreading the fruits of its intellectual endeavours include the launching of *kunqu* and Cantonese opera education and promotion projects; the prevention, retreatment and rehabilitation of elderly fall victims; and the consultancy service to the industry offered by the Centre for Innovation and Technology.

CUHK's effort in promoting knowledge transfer is recognized by the University Grants Committee which applauded it for its encouraging innovations and interdisciplinary knowledge transfer projects and for making use of its community projects for the benefits of the community. In addition, the University's favourable performance in commercialization and exploitation of intellectual property rights were praised.

網址 Website: www5.cuhk.edu.hk/kto/

研究所

Research Institutes

人文學科研究所	Research Institute for the Humanities
人類傳意科學研究所	Institute of Human Communicative Research
中國文化研究所	Institute of Chinese Studies
中國科學院香港中文大學深圳先進集成技術研究所	CAS-CUHK Shenzhen Institute of Advanced Integration Technology
中醫中藥研究所	Institute of Chinese Medicine
太空與地球信息科學研究所	Institute of Space and Earth Information Science
心腦血管醫學研究所	Institute of Vascular Medicine
未來城市研究所	Institute of Future Cities
生物科技研究所	Institute of Biotechnology
光科技研究所	Institute of Optical Science and Technology
全球經濟及金融研究所	Institute of Global Economics and Finance
呂志和創新醫學研究所	Lui Che Woo Institute of Innovation Medicine
李嘉誠健康科學研究所	Li Ka Shing Institute of Health Sciences
材料科學及技術研究中心	Materials Science and Technology Research Centre
亞太工商研究所	The Asia-Pacific Institute of Business
亞洲供應鏈及物流研究所	Asian Institute of Supply Chains & Logistics
信興高等工程研究所	Shun Hing Institute of Advanced Engineering
香港中西醫結合醫學研究所	Hong Kong Institute of Integrative Medicine
香港亞太研究所	Hong Kong Institute of Asia-Pacific Studies
香港教育研究所	Hong Kong Institute of Educational Research
香港糖尿病及肥胖症研究所	Hong Kong Institute of Diabetes and Obesity
香港癌症研究所	Hong Kong Cancer Institute
消化疾病研究所	Institute of Digestive Disease
深圳研究院	Shenzhen Research Institute
理論物理研究所	Institute of Theoretical Physics
理論計算機科學與通訊科學研究所	Institute of Theoretical Computer Science and Communications
植物分子生物學及農業生物科技研究所	Institute of Plant Molecular Biology and Agricultural Biotechnology
經濟及金融研究所	Institute of Economics and Finance
精密工程研究所	Institute of Precision Engineering
網絡編碼研究所	Institute of Network Coding
數學科學研究所	The Institute of Mathematical Sciences
環境、能源及可持續發展研究所	Institute of Environment, Energy and Sustainability

截至2013年10月30日
For the year ended 30 October 2013

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Research in Numbers

2013–14年度獲撥研究資助局優配研究金

Number of Projects and Amount Awarded by Research Grants Council General Research Fund 2013–14

學科小組 Panel	獲資助項目數目 Number of Projects Awarded	獲資助項目金額(百萬港元) Amount Awarded (HK\$ million)
生物學及醫學 Biology & Medicine	63	50,384
商學 Business Studies	19	5,382
工程學 Engineering	44	26,541
人文學及社會科學 Humanities & Social Sciences	43	21,757
自然科學 Physical Sciences	27	18,228
總計 Total	196	122,292

截至2013年6月28日 For the year ended 28 June 2013

2013–14年度獲研究資助局協作研究金撥款之項目

Projects Funded by Research Grants Council Collaborative Research Fund 2013–14

項目統籌／部門 Project Coordinator/Unit	項目名稱 Project Title	總資助金額 (不包括附加行政費用)(百萬港元) Amount Awarded (exclusive of on-costs) (HK\$ million)
生命科學學院陳浩然教授 Prof. Edwin H.Y. Chan, School of Life Sciences	針對多聚谷氨酰胺疾病RNA及蛋白質毒性開發以多肽類為基礎的療法 Targeting RNA and Protein Toxicities of Polyglutamine Diseases Using Peptidyl Inhibitors	7.04
物理系朱明中教授 Prof. Chu Ming-chung, Department of Physics	大型強子對撞實驗：新物理的追尋 Searching for New Physics with the Large Hadron Collider	8.66
機械與自動化工程學系劉雲輝教授 Prof. Liu Yun-hui, Department of Mechanical and Automation Engineering	醫療手術輔助機器人 Assistive Surgical Robots	9.90
心理學系 Catherine A. McBride 教授 Prof. Catherine A. McBride, Department of Psychology	中文和英文閱讀能力發展：遺傳和神經科學相關因素 Reading Development in Chinese and in English: Genetic and Neuroscience Correlates	7.51

截至2013年12月24日 For the year ended 24 December 2013

* 自1991–92年度以來，中大共有三十七個項目獲研究資助局協作研究金(前稱 Central Allocation)撥款資助。

Since 1991–92, there have been a total of 37 projects led by CUHK funded by Research Grant Council Collaborative Research Fund (formerly named Central Allocation).

獲研究資助局主題研究計劃撥款之項目

Projects Funded by Research Grants Council Theme-based Research Scheme

項目統籌／部門 Project Coordinator/Unit	項目名稱 Project Title	總資助金額 (包括附加行政費用)(百萬港元) Funding including indirect /on costs (HK\$ million)
第一輪 1st Round 病理解剖及細胞學系王昭春教授 Prof. Nathalie Wong, Department of Anatomical and Cellular Pathology	肝癌基因組研究計劃：轉化基因發現為臨床應用 The Liver Cancer Genome Project: Translating Genetic Discoveries to Clinical Benefits	45.000
第一輪 1st Round 化學病理學系盧煜明教授 Prof. Dennis Lo, Department of Chemical Pathology	大規模平行測序在癌症分子診斷的應用 Massively Parallel Sequencing of Plasma Nucleic Acids for the Molecular Diagnostics of Cancers	31.999
第三輪 3rd Round 病理解剖及細胞學系羅國煒教授 Prof. Lo Kwok-wai, Department of Anatomical and Cellular Pathology	系統性開發鼻咽癌的分子靶標 Systematic Development of Molecular Targets for Nasopharyngeal Carcinoma	55.61
第三輪 3rd Round 內科及藥物治療學系馬青雲教授 Prof. Ronald C.W. Ma, Department of Medicine and Therapeutics	對糖尿病心血管及腎臟併發症的跨組學基因研究—從創新發 現至個性化治療 An Integrated Trans-omics Approach to Diabetic Cardio-renal Complications: From Novel Discoveries to Personalized Medicine	60.33
第三輪 3rd Round 工程學院院長汪正平教授 Prof. Wong Ching-ping, Dean of Engineering	智能化太陽能技術：採集、存儲和應用 Smart Solar Energy Harvesting, Storage, and Utilization	60.33

研究資助局是教資會轄下諮詢組織，負責向香港特區政府建議香港高等教育機構在學術研究上的需要，並向獲教資會資助的院校分配撥款，以進行學術研究。

The Research Grants Council operates under the aegis of the UGC and functions as an advisory body responsible for advising the HKSAR Government on the needs of Hong Kong's higher education institutions in the field of academic research and for the distribution of funding for academic research projects undertaken by UGC-funded institutions.

網址 Website: www.ugc.edu.hk/big5/rgc/ (Chinese), www.ugc.edu.hk/eng/rgc/ (English)

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**Embrace our Culture
Empower our Future**

香港中文大學五十周年
50th Anniversary of CUHK