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Popular Science Special Lecture Series:

How Nobel Prizes Are Won

Lectures explaining Science behind
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9 Dec 2022 (Fri) · 4:00 – 6:30pm

LT2, Yasumoto International Academic Park, CUHK

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我們從哪裡來？
Where do we come from?

許浩霖 教授 Prof. HUI Ho Lam Jerome
生命科學學院 School of Life Sciences
廣東話主講 In Cantonese

量子糾纏和貝爾不等式
Quantum Entanglement and Bell Inequalities

王大軍 教授 Prof. WANG Dajun
物理系 Department of Physics
英語主講 In English

一「點」相「連」：
以分子快速拼接探索生物世界
"Click" to Explore the Biological World

吳基培 教授 Prof. NG Kee Pui Dennis
化學系 Department of Chemistry
廣東話主講 In Cantonese

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現代智人從何而來；以及我們如何與其他生物和古人類相關和不同一直是生物學的核心問題。今年，2022年諾貝爾生理學或醫學獎授予Svante Pääbo，以表彰他“在已滅絕的人類基因組和人類進化方面的發現”。在這個40分鐘的公開演講中，我將介紹進化生物學的基本概念、古基因組學的發現以及現代基因組學時代使用的技術。

Where do we, *Homo sapiens* come from; and how do we relate and different to other organisms and hominins have always been a central question in biology. This year, the 2022 Nobel Prize in Physiology or Medicine is awarded to Svante Pääbo “for his discoveries concerning the genomes of extinct hominins and human evolution”. In this 40-minute public talk, I will introduce the basic concepts in evolutionary biology, findings in paleogenomics, and techniques used in the modern genomics era.

量子糾纏和貝爾不等式
Quantum Entanglement and Bell Inequalities

王大軍 教授 Prof. WANG Dajun
物理系 Department of Physics

目前，全世界都在努力開發新的量子技術，以利用量子資源實現更快的計算、更安全的通信和更精確的傳感，這場所謂的第二次量子革命發端於今年獲頒諾貝爾物理學獎的三位科學家的工作。在本次講座中，我將首先解釋什麼是量子糾纏和貝爾不等式，然後我將介紹三位諾貝爾獎獲得者的相關實驗工作，以及他們的結果如何改變了我們對量子力學的認識。

There is currently a worldwide effort in developing new technologies to harness resources provided by quantum mechanics, e.g., quantum entanglement, to realize faster computation, more secure communication, and more precise sensing. The onset of this so called second quantum revolution is deeply rooted in the cited works of this year’s Nobel prize in Physics. In this talk, I will first explain what quantum entanglement and Bell inequalities are. I will then introduce the experiments of the three Nobel laureates to test Bell inequalities and how their results changed our understanding on quantum mechanics.

一「點」相「連」：以分子快速拼接探索生物世界
“Click” to Explore the Biological World

吳基培 教授 Prof. NG Kee Pui Dennis
化學系 Department of Chemistry

化學家熱衷於合成各種複雜的分子作不同的應用。為此，化學反應必須在溫和條件下快速有效地進行，同時不產生副產物。Sharpless教授在2001年提出點擊化學的概念—以高效反應拼接建構組元，當中以由Sharpless和Meldal教授於2002年各自報導的銅催化疊氮—炔烴環加成反應最具代表性。其後，Bertozzi教授於2003年進一步開發了可於生物體內進行的點擊反應，為生物正交化學奠下基礎。它已在化學生物學中成為重要的研究工具，讓科學家能夠追蹤細胞中的生物機制，其潛在應用亦已擴展到診斷和靶向治療。本講座將介紹2022年三位諾貝爾化學獎得主開創先河的研究成果。

Chemists are keen to build sophisticated molecules for various applications. To this end, reactions that proceed quickly and efficiently under mild conditions without producing unwanted by-products are essential. The concept of click chemistry was coined by Sharpless in 2001, which referred to the linking up of small building blocks with a handful of highly efficient reactions. The copper-catalysed azide-alkyne cycloaddition reaction, which was reported by Sharpless and Meldal independently in 2002, was the most representative example that has triggered numerous studies in this field. Bertozzi, in particular, further developed click reactions that work inside living organisms and introduced the concept of bioorthogonal chemistry in 2003. It has become an essential tool in chemical biology, enabling scientists to track biological processes in cells. Its potential applications have also been extended to diagnostics and targeted therapies. In this talk, the seminal work of the three winners of the Nobel Prize in Chemistry 2022 will be highlighted.