Honorary Doctor of Science

Professor Jean-Marie LEHN

Citation written and delivered by Professor Horace IP Ho-shing

Chancellor:

Ladies and Gentlemen, when we look around the auditorium today, we see our distinguished honorees, fellow guests, colleagues and friends. Some are older, some are younger. Some are tall, and some are not so tall. Some wear dresses, some wear ties. Some wear glasses, some have perfect vision. We are all individuals with diverse life experiences, our own thoughts, likes and dislikes, passions and phobias, each unique in so many different ways.

Yet to an organic chemist, beneath this veneer of difference we are all constructed out of the same building blocks, a complex arrangement of molecules, of carbon and hydrogen that over the past 13 billion years or so has evolved into the high-thinking entity sat next to you right now: a living human.

How did these molecules combine to form such complex creatures as Einstein or Leonardo da Vinci, or, of course, Professor Jean-Marie Lehn? How did such tiny molecules recognise each other, match and self-organise to eventually form what we refer to as life?

These are some of the questions that have motivated Professor Lehn during his illustrious career spearheading major developments in supramolecular chemistry and dynamic chemistry and in materials science, too.

Professor Lehn was born days after the outbreak of war in Europe in 1939 in a medieval city called Rosheim on the Franco-German border. His father was a baker, a man who made things, perhaps an early inspiration for the scientist-in-the-making. He was also an organist, an instrument that along with the piano Professor Lehn would learn and continue to play until today, drawn by the balance of theory and art that is essential to interpreting a musical score. Interestingly, Professor Lehn counts Pierre Boulez, the celebrated French composer of contemporary classical music, as a friend and source of inspiration, Boulez being one of the 20th century's great musical experimenters.

Upon reaching the University of Strasbourg in 1957, Professor Lehn's plan had been to study philosophy but he quickly became immersed in the experimental power of chemistry, impressed by the coherent and rigorous nature of the subject. Unlike philosophy, a more elusive matter, science was verifiable and followed logical rules, rather like a musical composition. So great was his interest that he began to explore deeper into the intricate world of molecules in the comfort of his own home using vials, pipettes, beakers and test tubes that he bought himself.

Following his PhD in natural product chemistry with Professor Guy Ourisson at the same University, he headed to Harvard University where he joined a team headed by Professor Robert Woodward, the winner of the Nobel Prize in Chemistry in 1965. The team had embarked on an enterprise of immense magnitude: the total synthesis of Vitamin B12. For the layperson it is difficult to appreciate the challenge facing the Harvard scientists. An analogy offered by Professor Lehn is that it was like constructing a very complex building made of different types of stones, with a blueprint that had to be adapted along the way.

After a year at Harvard, Professor Lehn returned to France where he began research that would eventually result in the definition of a new field of chemistry. Supramolecular chemistry, a term coined by Professor Lehn, looks beyond the molecule to the complex entities formed by groups of molecules. His research began with a study of the basis of molecular recognition and blossomed into a broader study of how molecular information in the programming of chemical systems contributes to self-organisation processes and how chemical objects and systems respond to external factors by modification and reorganising.

Professor Lehn has referred to the development of his research over the past years as a "progressive construction or widening of perspective" within the field. Thus some of the most important concepts related to the exploration of supramolecular chemistry cover areas such as molecular self-assembly, folding, molecular recognition, host-guest chemistry, mechanically-interlocked molecular architectures and dynamic covalent chemistry, leading towards what he has described as an adaptive and evolutive chemistry.

Professor Lehn's research led in 1987 to the Nobel Prize in Chemistry, which he shared with two other chemists—Professor Donald J. Cram and Charles J. Pedersen—for the study of highly selective interactions between molecules, in particular the synthesis of cryptands and further elaborated receptor molecules that

bind to form complex supramolecular architectures that may have functional properties, in particular in biology. By combining organic chemistry and physical methods, Professor Lehn designed new cavity-containing molecules called cryptands that were meant to mimic biological substances playing a critical role in the movement of signals through the nervous system. One way of conceptualising this relationship is to view the cryptand as a lock and the bound cation as the key, thus creating a cryptate through a robust match and, in general terms, effecting molecular recognition, that is, enabling the receptor to recognise and selectively bind a substrate, ion or molecule.

Over the years, Professor Lehn has spearheaded the extension of supramolecular chemistry into different disciplines. From understanding and manipulating the interface of chemistry with biology, we can envision novel biologically active substances that may lead to treatment options based on supramolecular pharmaceuticals. Likewise, by incorporating the approaches of self-organisation at the nano scale, material scientists can potentially replace the tedious and often expensive fabrication of nanomaterials today by a sort of self-fabrication process.

Stemming from the innovative idea of how molecules interact with each other in a non-covalent way, Professor Lehn has made great contributions to mankind through his creative applications of supramolecular chemistry into various disciplines in medicine, material science and nanotechnology. He has inspired many new areas of research linking the basic concepts of self-organisation and dynamics in chemistry to a range of applications which will potentially make our world more sustainable.

Winning the Nobel Prize 23 years ago has made Professor Lehn a busy man, combining his research activities with travelling the world to give lectures and receive awards, such as the degree we will confer on him today. Professor Lehn, author of more than 850 scientific publications, has been honoured by over 50 distinguished academies and institutions around the world, including the French Academy of Sciences, the US National Academy of Sciences, the Royal Society, the Chinese Academy of Sciences, the Russian Academy of Sciences, the Indian Academy of Sciences, and the Royal Netherlands Academy of Arts and Sciences. He has also received over 45 honorary degrees and distinguished awards such as the Gold Medal of the French National Centre for Scientific Research, the Davy Medal of the Royal Society and the Paracelsus Prize of the Swiss Chemical Society.

As one of the most celebrated scientists working today, it comes as no surprise that Professor Lehn is acutely aware of his responsibility to champion the study of science and to remind us all that chemistry pervades every aspect of life, that in fact our lives are pure chemistry, that the people around us, our feelings and senses, our abilities and our experience, our height and our weight, all trace their origins back to molecules organising themselves billions of years ago in the emptiness of space to create…life.

In recognition of his invaluable contributions to our understanding of chemistry and the world we live in, Mr Chancellor, it is my great honour to present Professor Jean-Marie Lehn to you for the award of the degree of Doctor of Science, *honoris causa*.