

## Prize for molecule research



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### ABSTRACT

Jean-Marie Pierre Lehn is a French chemist born in 1939 in Rosheim. In 1957 he achieved a baccalaureate in philosophy and experimental sciences before going on to the University of Strasbourg to study Physical, Chemical and Natural Sciences. Then, after obtaining his bachelor degree in "Licencié ès sciences" in 1960, he worked as a junior member of the Centre National de la recherche scientifique at Ourisson's lab to work towards his Ph.D. Lehn obtained his degree of Docteur ès Sciences 3 years later and went to Robert Burn Woodward's lab, Harvard, for a year to work on the total synthesis of B12. In 1966 he became an assistant professor at the Chemistry department of Strasbourg University; it was here that Lehn became interested in the nervous system and how chemistry could contribute to him. While trying to find a component which could mimic the actions of natural antibiotics in making membranes permeable to cations, Lehn designed the cation cryptates. This led to the development of "supramolecular chemistry." In 1970 Lehn became a professor and spent time lecturing at both Strasbourg and Harvard. He was awarded the Nobel Prize in Chemistry in 1987 for the development and use of molecules with structure-specific interactions of high selectivity.

### Interview with Nobel Prize winner Jean-Marie Pierre Lehn

Jean-Marie Pierre Lehn [Figure 1] is a French chemist who won the Nobel Prize in chemistry in 1987 for his synthesis of cation cryptates.<sup>[1]</sup> These are cage-like molecules which have an internal cavity that is capable of containing another molecule. He was the innovator in the field of "supramolecular" chemistry which is all about molecular recognition and how molecules selectively bind together.<sup>[1]</sup> Despite being at the forefront of this field, he looks back to the 1894 analogy of a lock and key to explain how molecules selectively bind to one another because a key has been designed to fit a certain lock in the same way that certain molecules are specifically designed to

bind to one another.

His research also touched on the problems which are linked with molecules binding together. This led to the realisation that specific interactions are needed for recognition between molecules; these interactions are different to those which hold atoms together. Atoms link together through what are known as covalent bonds to make molecules, while molecules bind together by non-covalent interactions.<sup>[2]</sup> This has led to the discovery of the field of chemistry known as "supramolecular" chemistry, the domain which Lehn has worked in for 30 years which leads to non-covalent bonds being manipulated for inducing recognition processes.

Lehn believes that his science career began in

high school. Although, at first, he wanted to study Philosophy at University, in the end, he found that science was more interesting. He began with biochemistry before settling on chemistry as what he wanted to do with his life, because he liked the idea that chemistry had the ability to transform matter. He believes that science and philosophy are closely linked; in fact science is more like philosophy than the latter because in his eyes the idea of philosophy is to acquire wisdom and that is what science does [Figure 1].

When he began his career as a chemist, Lehn never went looking for the celebrity status that he has achieved among his peers, and it has certainly not changed the way he lives his life. As for his own role models, he goes back to his interest in philosophy with the likes of Kant, Nietzsche and Freud. Lehn's interest in Freud comes from the way he tackled what most people at the time thought of as taboo subjects. This struck a chord with Lehn because he disregards the idea that you can forbid the accumulation of knowledge. To illustrate his point, he uses the example of the creation story in Genesis as he believes that Eve taking the apple from the tree of knowledge was the first act of science as he believes that when trying to acquire knowledge it is important that scientists do not respect the boundaries set down by those in authority.

Lehn believes that science has limitless possibilities and any question can be challenged by science; however, it is also important for scientists to first ask whether or not now is a reasonable time to tackle the question. Lehn takes the example of the question "what is consciousness?" As while he personally believes that it is a consequence of human nature and the way our brain functions, this cannot be proven by science right now.

Lehn has a firm belief that there are no official scientists and this contributes to the comradely nature of science, where, when a scientist publishes any work; other scientists always try to critique and check their findings. To do this they use three criteria: is it observable, is it reproducible and is it explainable?

With his unquenchable desire for knowledge, Lehn finds it incredible when people do not want to understand science and how it shapes our world. He found it even more incredulous when a French Politician from the Green party refused to listen to a



**Figure 1: John-Marie Pierre Lehn (Available at: [http://en.m.wikipedia.org/wiki/File:Jean-Marie\\_Lehn.jpg](http://en.m.wikipedia.org/wiki/File:Jean-Marie_Lehn.jpg))**

scientific explanation from one of Lehn's peers. He believes that someone who people are going to vote for should always try to understand the world around them so that they can represent the people of their nation to the best of their abilities.

While Lehn admits that there are some things which are more enjoyable than science in his life – he enjoys playing the piano and would have liked to be a pianist – he enjoys his job so much that if he were reborn he would still be a scientist because he believes that it is the best way to develop the brain in a controlled way. Science is a way of making sense of why we are here – a question that people do not get the chance to answer in everyday life. Science helps people to have a rational approach to life and accept that when you ask a question there are people out there who know better, and we should accept that. Lehn uses the example of having a referendum on genetically modifying organisms; most of the population don't know anything about the science behind this type of genetics. Instead it would come down to populism, with political parties trying to convince voters what is right when they cannot possibly understand it like scientists do. After all, would you want to hold a vote as to who obtains the position of pilot of an airplane and award the job based on his popularity or would the fact as to whether he knows how to fly the plane be more desirable?

For Lehn the most important thing in life is following your passion, whether it is being a chemist or a

baker, if you have the opportunity to follow your dreams then you should do whatever you can to accomplish them. It is Lehn's belief that science is a profession and requires a lot of hard work. Take the analogy of a tennis player; you have to train for hours every week to become a professional and it is the same if you are a chemist. You have to work hard to achieve all of the knowledge that you need to become a good scientist. The way to achieve success is hard work as you cannot expect success to fall into your lap with a click of the fingers, this is

the example that Lehn hopes the next generation will take from his career as without the hard work he put in, he would never have achieved his dream, nor won the Nobel Prize!

## References

1. Available from: <http://superstarsofscience.com/scientist/jean-marie-lehn>. [Last cited on 2012 Mar 5].
2. Available from: [http://www.nobelprize.org/nobel\\_prizes/chemistry/laureates/1987/lehn-cv.html](http://www.nobelprize.org/nobel_prizes/chemistry/laureates/1987/lehn-cv.html). [Last cited on 2012 Mar 5].

## About the Author

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**Chloé Forsyth** studies Biology, English, History and Religious studies at Sir Roger Manwood's School. She hopes to go university to study English and eventually become a journalist.

## Addendum to Issue 11

We apologise for any inconvenience that the following mistakes to Issue 11 may have made.

### Exploring the quantum world

Lauren Peter's biography should have read as follows:

'Lauren Peters is interested in the physics behind our natural world and started studying Physics at university in September 2011'

### Household bacteria: Everyday elimination methods uncovered!

1. All DH5 $\mu$  in the manuscript should be DH5 $\alpha$  (alpha instead of mu).
2. In the abstract, e-coli should be *E. coli*
3. *Escherichia coli* should be written as *E. coli* after the first mention.
4. RPM is written as rpm.