Honorary Doctor of Science
Professor Ada YONATH

Citation written and delivered by Professor LU Jian

Mr Pro-Chancellor:

Professor Ada Yonath was born in 1939 into a family that struggled with financial and health issues. Her father passed away when she was only 11 and her mother was hard pressed to support her children.

But through great strength of will, Professor Yonath overcame the material deprivations of her childhood to earn a place at the prestigious Hebrew University in Jerusalem where she studied chemistry, biochemistry and biophysics.

It was during this time that she began to develop a fascination with crystallography, i.e., how atoms are structured and organised. Her PhD at the Weizmann Institute in Israel concentrated on high-resolution structures of collagen, a protein that exists in animal tissue like skin and cartilage.

But she was driven to delve deeper into the complexities of living organisms, and began to formulate plans that would eventually enlighten our understanding of the ribosome.

The ribosome is like a factory inside a cell's cytoplasm. It crunches the genetic data supplied to it by messenger RNA, data which replicate the DNA located in the nucleus of a cell, to determine the sequence of amino acids used to build proteins.

In addition she seeks for an understanding how the ribosome could offer insight into the very nature of the creation of life.

Her ambition to create a comprehensive understanding of the structure and function of the ribosome had been tried before, but without success – hence the negativity heaped upon Professor Yonath's project.

But she ignored her detractors and paid attention only to the intense intellectual curiosity that spurred her on.

And, after an almost super-human effort to scale the seemingly impossible task of creating the first ribosome crystals, Professor Yonath succeeded.

She was awarded the Nobel Prize in Chemistry in 2009, and her critics were silenced. They finally appreciated that Professor Yonath is one of the most important scientists working today.

Professor Yonath's "Eureka!" moment in her research was when she finally determined the ribosome structure and understood how it functions. To appreciate the story, you have to understand that ribosomes are not very stable, which is why her fellow scientists failed in producing well-ordered crystals from them, and therefore dismissed her idea of creating a three-dimensional structure of the ribosome.

She initiated her research when she read that in the North Pole the ribosomes of hibernating bears were found to be packed in well-ordered crystalline arrays. She assumed that this is the mechanism nature provides to keep the ribosomes relatively stable during the cold winters, while the bears are "sleeping", so that when they wake up their ribosomes can produce the required proteins. This was very good news for someone who was researching something that was known to be unstable.

Based on this finding she posited the idea that creatures living in harsh environments—like the winter at the North Pole—can offer a suitable setting for the crystallisation of their ribosomes, and greater opportunities for scientists to analyse them.

So Professor Yonath went in search of organisms found in inhospitable extremes close to where she was working. She explored the Dead Sea in Israel which, as the name suggests, supports little in the way of life. The ribosomes taken from one of the bacteria samples in the Dead Sea proved to be suitable for producing crystals of quality sufficient for crystallographic studies. Hence, Professor Yonath and her team could formulate conditions for the production of additional specific ribosome crystals.

It was a vital development, and Professor Yonath and her team at both the Weizmann Institute in Israel and the Max Planck Institute in Germany eventually proved the viability of ribosome crystallography.

The crowning moment came in the mid-1990s after she demonstrated the feasibility of this project and when their procedures were replicated at other institutions. Replication meant she was no longer the one voice in the field, the Dreamer, or the "village fool", as she was termed.

The importance of Professor Yonath's work cannot be underestimated from a medical point of view, since almost half of the clinically used antibiotics paralyse the ribosome. You might have heard from the news that some pathogenic bacteria have developed resistance to most antibiotics, and consequently are losing their power to fight infections. The concern is that these drugs might not be able to protect us in the future. Professor Yonath's work in this frontier is significant because her results could lead to the enhancement of existing drugs, or the development of new drugs, to combat bacterial infections.

So, Mr Pro-chancellor, I submit that Professor Ada Yonath embodies all that is impressive about scientific discovery: the drive to find out what lies beyond; a compulsion to understand how a thing works and where it comes from; and most of all a refusal to give up no matter how sharp the criticism might be.

In recognition of her contributions to human understanding, scientific enquiry and public health, I request City University of Hong Kong to confer upon her the award of Doctor of Science *honoris causa*.