Professor Aaron J CIECHANOVER

Citation

For many great scientists, their scientific dreams often started young. Prof Aaron J Ciechanover began his early by collecting flowers, leaves and the skeletons of snakes, fish, frogs and turtles. This "amateurish flirting with biology" was to grow into a thirst for formalized knowledge of biology and chemistry. Thanks to wonderful teachers, this love affair morphed into passionate probings of the big questions in science.

Having chosen medicine as a compromise between the domestic need for financial security and his natural curiosity about biology and chemistry, Prof Ciechanover could easily have stayed in clinical medicine. But he was drawn to the pursuit of the causative rather than the symptomatic in pathology. It took self-knowledge and moral courage to choose the uncertainty of a life in scientific research over the economic and social certainty of a practicing physician. For a person of Jewish descent, this choice was not easy, for as he himself puts it, "medicine has traditionally been the ultimate in Jewish professions." Even though he graduated from medical school, the world is to know him not as a medical doctor, but as a research scientist who eventually went on to win the ultimate prize in chemistry.

Thus began five years of exciting graduate studies. Later, he spent three years at MIT where he learned how to approach a scientific problem. In his own words, he learned two principles: "first, to select an important biological problem, preferably an unobvious and a non-mainstream one", and second, "to make sure that there are appropriate research tools to approach it experimentally." He learned to "dig deep into a problem, to question, to doubt, to ask and to discuss". He showed courage in swimming against the tide and in believing in his own gut feeling.

The world is grateful that he chose a life of discovery for what follows is the discovery of life's own death-labeling system. Prior to this, scientists have concentrated on the synthesis of proteins. But Prof Ciechanover and his doctoral thesis mentor Prof Avram Hershko decided to go against the stream and delve into the obverse process of how proteins break down. In doing so, they unlocked the secrets of the function of a regulatory system that is central to the cell. This understanding is highly useful in the production of new drugs for various types of diseases, such as certain malignancies, immunological malfunctions, and neurodegenerative disorders such as Alzheimer's disease. Some drugs are already in use, others are in the pipeline all because of this revolutionary cognition. Thanks to this breakthrough, we now understand how the cell controls a number of key biochemical processes. The small protein that will forever be linked to Prof Ciechanover's name is "ubiquitin", which in Latin means "everywhere", and is found in all cells of high organisms, from yeast, through to plants and above.

This major breakthrough in medical research shows that Prof Ciechanover's early belief that the future "resided in biology" and in deciphering the basic molecular processes was right. Characteristically, in his own modest manner, he attributed his scientific achievements to "sheer luck or serendipity" or "probably both". But we know that luck favors the ready and the stubborn who have the patience to peel off layers of problems the way one peels off layers of an onion. Much of Prof Ciechanover's learning came not from formal lessons but in mentorship

relationships, in critically adopting his mentors' way of thinking, and different mentors offered different intellectual environments to challenge his thinking.

In certain ways, Prof Ciechanover's values and attitudes have close affinity with the Chinese. One of those dominant values is gratitude. Growing up parentless after the early death of his parents, he was taken under the wings of his aunt, and later of his brother and sister-in-law. To them, and even to his wife and son, he has expressed profound gratitude for their emotional and physical support. He considers them "wonderful life partners" who enabled him to fly high, in his own words, "on the wings of my dreams". This grateful appreciation extends also to his mentors and collaborators who contributed to his apprenticeship as a scientist. First and foremost, his graduate studies advisor, Prof Avram Hershko, with whom he shared the Nobel Prize for the breakthrough discovery. Heshko represented the ideal balance between original, bold, daring and visionary scientist on the one hand and a well controlled one on the other. He singles out Ernie Rose, another fellow eminent scientist and collaobrator, and the third awardee, for showing him that "methodical thinking is not always necessary in science" and may even be counter-productive at times, and that "being erratic and disordered and even absent-minded, thinking in a most unconventional manner, can yield wonderful ideas and results." He finds this approach fertile in stirring feelings of instability, allowing him to challenge basic assumptions and knowledge. He soars high on the wings of the non-traditional. And finally, he expresses a debt of gratitude to his MIT mentor Harvey Lodish for granting him complete freedom to pursue his own passionate ideas, and for adopting a "passive-active educational approach" in their intellectual relationship. It is this ability to appreciate the unorthodox that makes for a great scientific mind. In describing his feelings of gratitude Prof Ciechanover has given us a glimpse of his own scientific attitude and secrets of success.

For his bold and seminal thinking and his concrete scientific achievements, Prof Ciechanover has been honored and garlanded by scientific bodies and academic institutions the world over. His list of accolades runs into multiple pages that no ordinary citation can do full justice. He was awarded with numerous honorary doctorates, and he courted as a member by various eminent scientific bodies throughout the world, from the Israeli National Academy of Sciences and Humanities, the Pontifical Academy of Sciences of the Vatican, the American Philosophical Society to the National Academy of Sciences and recently the Institute of Medicine of the National Academy of Sciences of the USA. Before the Nobel Prize he was awarded the prestigious Albert Lasker Award in Basic Medical Research, regarded by many as the second most important Prize in biomedicine after the Nobel Prize.

He is a prolific writer of articles, reviews and books and has altogether close to 200 contributions. Given his medical background, it is not surprising that he also holds a couple of patents in the development of an anti-tumor agent and of the treatment of malignant cells. Only 61 years of age, Prof Ciechanover has lived a full and blessed life which more than compensated for his tragic orphanhood. Today, we celebrate the life of a humanistic scientist who has dared to go down the path least traveled and, following his intellectual daring and passion, come up with the results to gladden the hearts of every scientific discoverer and dreamer.

Mr Pro-Chancellor, on behalf of the Council of the Hong Kong University of Science and Technology, I have the great honor of presenting to you, Prof Aaron J Ciechanover, Distinguished Research Professor in the Faculty of Medicine of the Technion-Israel Institute of Technology in Haifa, and 2004 Nobel Laureate in Chemistry for the award of Doctor of Science *honoris causa*.