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Headline: GYSS@one-north 2015: In Defense of Scientific Curiosity

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Hypothesis-driven research should not be neglected, says a panel of eminent researchers at the Global Young Scientists Summit 2015.

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BY SIM SHUZHEN



AsianScientist (Jan. 22, 2015) - Researchers will achieve the most success by working on questions that excite them intellectually, rather than by limiting themselves to problems with immediate practical applications, said a panel of eminent scientists on Wednesday at the Global Young Scientists Summit, held at Nanyang Technological University from 18-23 January, 2015.

The panel, titled "Turning Insights into Innovation," was chaired by Professor Arnoud de Meyer, president of Singapore Management University (SMU), and comprised Nobel Laureates Aaron Ciechanover (Chemistry, 2004) and Michael Levitt (Chemistry, 2013), Turing Award winner Shafi Goldwasser (2012), and Millennium Technology Prize winner Michael Grätzel (2010).

An investment for the long haul

Because government funders of research typically want a return on their investment, scientists are increasingly expected to commercialize their work. Yet, the panel members' choice of research topics has always been determined by their own interests, rather than by the potential for practical or commercial applications.

Professor Ciechanover's discovery of ubiquitin-mediated protein degradation (a mechanism used in cells to degrade and recycle proteins), for example, was purely curiosity-driven.

"I never thought about a disease, I never thought about a drug. I only thought about the biological question," he said, adding that ubiquitin's role in diseases such as cancer and neurodegenerative disorders only became apparent later. Today, many pharmaceutical companies are developing drugs to target this pathway.

"Important questions stand the test of time. They become more and more important and more people pick up on them... it's a natural process. I don't think that young scientists at the assistant professor level should bother about a drug at the end of the road, absolutely not," he said.

Professor Levitt, who pioneered computational methods for understanding the structures of biological molecules such as DNA and proteins, said that governments would probably get a much higher return on their investment if they gave scientists the freedom to explore questions that interested them.

"It seems to me that if any one government says we are from now onwards going to force all our scientists to have a very clear metric, to be definitely involved in translation - all that would happen is the best scientists would leave the country and that country's economy will crash," he said.

At the same time, scientists also have a responsibility to effectively communicate the importance and value of their research to the public, Levitt noted.

A place for innovation in the face of big data

The panel also commented on whether the ready availability of big data has changed the nature and practice of science.

"I think this is a very big question of whether there is a role now for the individual scientist, or whether you can just go and throw your bait into the ocean of data and some fish will be caught," said Ciechanover.

Although non-hypothesis-driven research has certainly become a lot easier to carry out, Ciechanover doesn't believe that big data will fundamentally change the nature of scientific thinking.

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"There is a lot of discussion about the role of big science versus old, classical science, and I think that at the end of the day the pendulum will stop in the middle... I'm saying that still there is a place, a significant place for the single scientist in his lab, being helped by informatics and so on, to come up with an idea that nobody thought of, to think out of the box. And I'm sure that the place of this scientist will never go away," he said.

Professor Goldwasser, whose theoretical work has formed the basis of modern cryptography methods, added that with big data comes the need for ingenious algorithms to analyze the information in new and clever ways, thus presenting yet another opportunity for innovation.

"[Big data] doesn't threaten scientists but it does change the landscape. It's fascinating what you can find," she said.

Easy online access to big datasets and published findings has also leveled the playing field for researchers working in smaller research institutions, the panel said.

Striking a balance between blue sky and blue chip research

Professor Grätzel, who is known for his invention of dye-sensitized solar cells, which are an efficient and low cost alternative to standard silicon photovoltaics, said that original ideas were key to the translation of academic research.

"You have to have a unique selling proposition... The basic reason why someone would set up a company is that you have something unique to offer."

Governments and universities must, however, strike a balance between commercializing research and maintaining an environment that still encourages innovation, says Levitt.

"When you license something very quickly, you may be lucky but you're going to kill a lot of nascent technologies on the way... You really have to be very respectful of new ideas - startup companies are very delicate objects," said Levitt.

In Levitt's opinion, research environments should have three qualities in order to encourage scientists to translate their work: Patience, generosity and openness. The openness of the US system, for example, has made it possible for scientists to move back and forth between academia and industry.

Become an expert first, then collaborate with other disciplines

While interdisciplinary research can have enormous impact, the panel advised young scientists to first focus on becoming experts in their own fields.

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"If you are not really delving into the details of what you are doing, then you will not be successful... It's a matter of really understanding the problem, of trying to dissect the problem to the very end. You cannot escape becoming an expert if you want to really leave a dent behind you, or solve a problem and identify yourself with a field," said Ciechanover.

While honing their own skills, scientists should also try their best to network and form collaborations with researchers from different but complementary scientific backgrounds, said the panel.

"In science today, the seams between disciplines are where a lot of the gold is," said Levitt.

Asian Scientist Magazine is a media partner of the Global Young Scientists Summit (GYSS@one-north 2015), taking place from 18-23 January, 2015 at Nanyang Technological University, Singapore. GYSS@one-north 2015 is organized by the National Research Foundation of Singapore in collaboration with its partners.