



Michael Purugganan: evolution of a scientist from chemistry to plant genomics

By Neda Barghi*

As researchers and scientists, we all read articles in prestigious journals such as *Science* and *Nature*, and secretly wish that one day the results of our scientific research would also get published in these journals. We usually imagine that such recognition will serve as a great milestone in our careers, and we may enjoy a smoother path in our professional lives afterwards. However, with the advent of new technologies and more advanced methods in research, exciting and new opportunities emerge in different fields of science that will intrigue our minds and captivate our hearts for knowing *the unknown*. Clearly, it takes a curious and brave individual to leave a convenient situation to discover the exciting unknown, and *that* is exactly what Dr. Michael Purugganan did.

He is a great example of a brilliant, determined and fearless scientist who after publishing his first paper in the journal *Science* in 1988 in physical chemistry changed his research field to the then new field of plant genomics. Having almost two decades of triumphant experience and achievements in science, he has published more than a hundred articles in peer-reviewed journals and has received numerous grants, fellowships and awards. Recently, he received the Severino and Paz Koh Award for Science at the 2014 Philippine-American Academy of Science & Engineering (PAASE) Annual Meeting and Symposium in Raleigh, North Carolina, for his outstanding and significant scientific contributions to the study of rice genomics and the implications for agriculture, food self-sufficiency and nutrition of communities in the Philippines and other developing countries.

Michael's admiration for science started at a very early age. When he was only 10 years old, he used to sneak into the NSDB (National Science and Development Board) complex (at the corner of Taft Ave. and Pedro Gil in Manila) after school to visit different laboratories. It was there where he got fascinated by

science and was inspired to become a scientist, as he was being nurtured in high school by his teachers at the Manila Science High School. His passion for science was also nourished at home by his parents who encouraged him to read books and choose a career and a path in life that would make him happy.

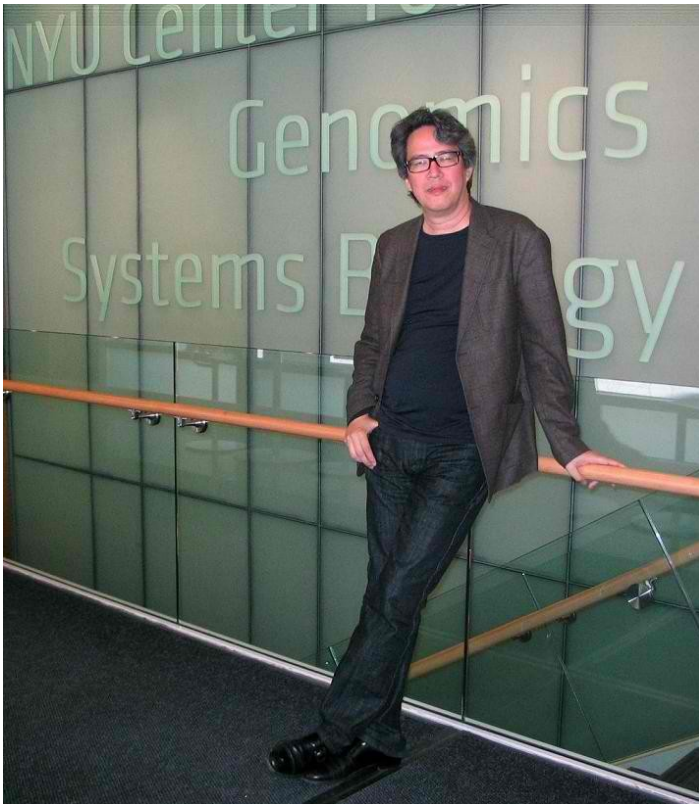
His personal fascination for science and his parents' encouragement for reading developed two strong passions in him: science and journalism. As he describes himself being torn between these two majors, he chose to study chemistry for his undergraduate degree at the University of the Philippines where he was a National Science Scholar. At the same time, he worked as



Through investigating the genomics and evolutionary history of rice, Michael aims to find the gene networks facilitating the adaptation of rice to environmental conditions.

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The multi-disciplinary expertise of Dr. Purugganan has enabled him to advance the research and academic excellence of the science departments at the NYU.

the features editor of the student newspaper, The Philippine Collegian, and as a news stringer for Time, Newsweek and the Associated Press. The political situation of the early 1980s troubled him as an idealistic youth. Imbued with a strong sense of nationalism, he covered the aftermath of the assassination of Philippine

opposition leader Benigno Aquino, Jr. in 1983, and also the downfall of the dictatorship of then President Ferdinand Marcos a few years after. While being threatened with a libel suit by then Philippine Prime Minister Caesar Virata, his outstanding writing skills were recognized by international news organizations. While still in college, he was offered a position as a foreign correspondent for the Associated Press which he turned down because he wanted to complete his college education.

In 1985, he graduated with a B.S. Chemistry degree, receiving the Amando Clemente Memorial Award from the University of the Philippines Department of Chemistry, and decided to pursue his graduate studies in Chemistry in the United States the following year. After receiving a Master's degree in Chemistry and three years into a Ph.D. program in the field of biophysical chemistry at Columbia University, New York, he published his first paper in Science. Despite his successful career launch, Michael was not extremely happy with biophysical chemistry research and was more interested in biology. Having read about the rise of the field of plant molecular biology, he left Columbia and started his Ph.D. in Botany at the University of Georgia.

He joined the laboratory of Dr. Susan Wessler, a prominent plant molecular biologist and geneticist, whom he now recognizes as the most important mentor in his career, for giving him the freedom to pursue studies on molecular evolution in her laboratory. He studied the role of transposable elements in alternative splicing of genes and in the evolution of introns, and in 1993 he graduated from the University of Georgia with a Ph.D. degree in Botany. At the same time, he also got a certificate in Global Policy from the same university which he now believes has given him "a broader perspective on how government policy is developed", and enabled him to "see the connection between the work that scientists do in the laboratory and its impacts on larger society".



As he describes himself, reading the book "Ontogeny and Phylogeny" by Stephen J. Gould inspired him to pursue a research field that would integrate evolution, genetics and development. It was then when he finally knew what he wanted to study: *evolutionary developmental biology* (evo-devo). Receiving the Alfred P. Sloan Foundation Postdoctoral Fellow in Molecular Evolution award allowed him to initiate his new research interest at the University of California in San Diego

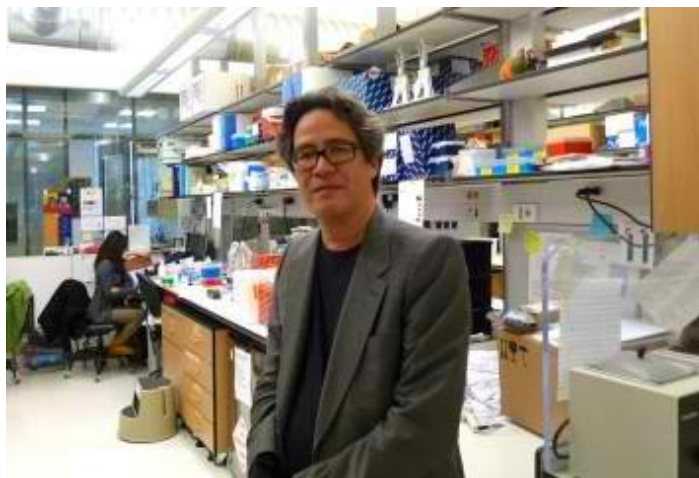
Michael Purugganan has taught several genetics and evolutionary genomics courses and mentored numerous graduate students and postdoctoral fellows.

where he spent the next two years working on the diversification of the plant MADS-box regulatory gene family and the molecular evolution of flower development.

He then joined the faculty of North Carolina State University at the Department of Genetics where his research involved the characterization of the origin of mutations responsible for developmental changes, and the effects of the evolutionary forces on these mutations. It was during his 10 years as professor at NCSU, investigating the population genetics of regulatory genes in plants, that his outstanding discoveries in plant genome evolution and molecular evolution of development took place. He joined the Department of Biology in New York University (NYU) in New York City in 2006, and became the Co-Director of the NYU Center for Genomics and Systems Biology in 2010. Since 2012 he has been serving as the Dean for Science in NYU and is also an affiliate faculty and the Co-Director of the Center for Genomics and Systems Biology at the NYU campus in Abu Dhabi in the Middle East.

After joining the faculty in NYU, Michael became interested in studying rice; mainly because rice is one of the most important food crops in the world, and in particular, because it gave reason for Michael to go home to the Philippines regularly. Since then, Dr. Purugganan has supervised several projects studying the evolutionary genomics of rice, rice domestication and environmental gene regulatory interaction networks in this crop species. His studies led to the discovery of a single domestication origin of rice for the two main subspecies of Asian rice, *indica* and *japonica*.

As an intelligent and fearless young scientist, Michael Purugganan was never afraid to leave what was familiar for the pursuit of what he perceived as new and interesting. At present, he considers “evolutionary and ecological genomics” as the rising research field that has enabled scientists to look into “e-genomes” and study the relationship between molecular, organismal and ecological phenomena with the help of new technologies. This fearlessness has paid off because the Alfred P. Sloan Foundation Postdoctoral Fellow award was only the first of many awards and recognitions, and a total of more than \$16 M grants that he has received in the more than two decades of his scientific career. He was recognized as the William Neal Reynolds Distinguished Professor in 2005 at North Carolina State University, elected as a fellow of the American Association for the Advancement of Science in 2005, and received a Guggenheim Fellowship in 2006. Since 2006 he has been the Dorothy Schiff Professor of Genomics in New York University. He also received the Kavli Frontiers of Science Fellowship of the Kavli Foundation in 2011. In addition, he serves on the editorial boards of several major journals, including *Molecular Biology and Evolution*, *Trends in Plant Science*, *Annual Reviews of Ecology, Evolution and Systematics*, *Genome Biology and Evolution*, and *Journal of Experimental Zoology B: Molecular and Developmental Evolution*.



Dr. Purugganan is also a member of the International Scientific Advisory Board of the Philippine Genome Center and is involved in several genomics projects including Philippine rice genomics. He predicts that the Philippine Genome Center will be “a major player in genomics in developing countries” that will become a better competitor among genomics facilities in the region by prioritizing the projects that “can be delivered relatively easily”. Having the experience as the Dean for Science and Co-Director of the Center for Genomics and Systems Biology at NYU, Dr. Purugganan envisions that Filipino scientists can pursue research directions better by having “more discretion on spending the funds without being shackled by bureaucracy” because “the ability to make decisions and carry them out is important to give scientists the freedom to really follow their research to where it leads them”. This issue seems more significant while considering that “Research goes wherever it goes.” and as it is the nature of research, the scientist goes where the research is heading. As Dr. Purugganan puts it in words, “We have a research proposal, we have a plan. It is highly unlikely we are going to stick to the plan.”

While he had the potential for a career in journalism during his college years, thanks to his excellent writing skills, Dr. Purugganan believes that choosing science is one of the best decisions he has ever made. He states, however, that his journalism experience has helped him to “write clearly to reach an audience”, and “communicate science to the general public”. Indeed, he advises the young scientists to “learn how to write clearly and deliver riveting talks” because he believes that the ability of scientists to communicate their science will advance their research. He mentions that his journalism experience has served as a great means for him to “appreciate the importance of good communication as a scientist”, and he still considers himself “a reporter bearing news from the front lines of research”.

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