

DECODING NATURE

Science taking the cue from nature is nothing new. However, Dr. Shawn Hoon, a Senior Research Fellow at the Molecular Engineering Lab (MEL), is poised to bring things one step further.

“Just because we’re studying nature, it doesn’t mean that we’re going to deplete our natural resources,” Shawn says, dispelling the misconception about research on biomaterials. His work requires more finesse, often beginning at the cellular level, such as by studying the genetic code of noteworthy species and then replicating it in the lab.



Squid sucker ring teeth in a petri dish (Photo credit: NTU)

PLASTIC WITH TEETH

Shawn’s work taps on what can be found all around Singapore — diverse marine life. By studying the mechanisms of marine organisms, he has created super biomaterials with many viable applications today.

Inspired by the molecular structure of a squid’s sucker ring teeth, Shawn has worked with his collaborators at NTU to develop a plastic that is significantly harder and more durable than everyday plastics. This new biomaterial could potentially be made biocompatible for food or drug packaging, or even into hardy, water-resistant parts for organ implants. “It’s really about seeing how nature solves a problem and seeing whether you can mimic parts of it,” Shawn explains. Other developments include waterproof glue derived from mussels, and an extremely elastic material inspired by the egg capsules of sea snails.

Nature-inspired biomaterials can reduce the world’s dependence on unsustainable resources, paving the way for a greater conservation. But the process of bringing these materials to market is an uphill climb, as synthetic materials make for a stronger case on issues like cost. Still, the possibilities exist, as Shawn is in talks with various companies to bring this technology to life.

BEST OF BOTH WORLDS

Shawn’s foray into the field of molecular engineering was a gradual melding of his two interests in biology and computer science. After returning to Singapore with a degree in computer engineering from the United States, Shawn’s childhood interest in biology was rekindled by the Human Genome Project, one of the largest collaborative biological projects going on at the time. The trend of information gathering and computing in biology opened his eyes to another side of the field: “It was then I could see the parallel between what I learned in computer science, and in biology.”

In Singapore, a similar genome project was also in progress. The fugu (pufferfish) genome project at the NUS-IMCB was where Shawn picked up biology, and met his long-time mentor, Dr. Sydney Brenner.

CASTING A WIDE NET

Now in A*STAR, Shawn continues his work on the interface of several different fields, but with more freedom to pursue the projects that interest him. “You get to start the day by asking, ‘What should I work on today?’” he says. The congregation of talent also makes A*STAR the perfect crucible for the experimental nature of his work, where experts from different fields can collaborate to bring success to a project.

Shawn also attributes his interest in biomaterials to the vast possibilities of nature, some unknown to us even now. “People have looked at not just materials, but also at how nature has certain ways of doing things, like the way termites construct their homes, or how the shape of certain fishes gives it aerodynamic properties,” he explains.

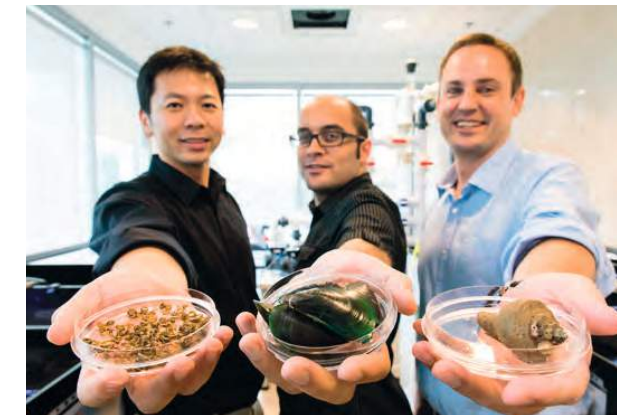
A DIFFERENT PERSPECTIVE

Shawn believes the most important aspect is to observe, and to question. “It’s not about finding the solution, but starting first by asking the right questions,” he says. This is something he tries to impart to the students he mentors in his lab at MEL. Shawn considers his job done when his students gain the confidence to ask questions, and conduct experiments on their own.

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Shawn believes that science education today should create an “environment of mentorship” and “allow students to accept failure as a part of learning”, preserving the curiosity they had as kids. Failure, he thinks, is the solution to success. After all, there is always something to learn from a failed experiment, while always trying to get the right result defeats the purpose of experimentation.

Shawn wishes to translate his work into something useful, something that will indirectly contribute to the industry in Singapore. Describing himself as “motivated, helpful and curious”, he also hopes to make use of his curiosity as a tool to guide the scientists of tomorrow.



(L-R) A*STAR Dr. Shawn Hoon, NTU Asst Prof Ali Miserez and Dr. Paul Guerette; holding squid ring sucker teeth, mussels and a sea snail in a petri dish (Photo credit: NTU)

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