

President's Science and Technology Awards

PUB chairman gets top honour for sewer system

He led team that linked every house to network of sewers; science award goes to cancer research team

Melissa Lin



Mr Tan Gee Paw's team took steps to close down the night soil collection service.

Mr Tan Gee Paw remembers when the last night soil bucket was collected back in 1987. Up until then, some toilets in Singapore still consisted of a wooden shack and a metal bucket. Every night, workers braved the stench to collect the buckets filled with human waste and take them to treatment plants.

This rudimentary system, a reflection of poor public health standards, would keep foreign investors away, according to 72-year-old Mr Tan, the chairman of national water agency PUB, who won Singapore's top science accolade last night.

He led a team that linked every house to a network of sewers, collected the last night soil bucket, retrenched the workers and closed down the service. "The night soil bucket, as Mr Lee Kuan Yew has said, was a symbol of the poverty of the past," said Mr Tan. "Imagine the indignity of man, having to carry... night soil buckets."

For this and other efforts, Mr Tan was awarded the President's Science and Technology Medal by President Tony Tan Keng Yam at a ceremony held at Resorts World Sentosa yesterday.

The President's Science Award went to a team comprising Professor Patrick Tan, 46, from Duke-NUS



President's Science Award recipients (from left) Patrick Tan, Teh Bin Tean and Steven Rozen were recognised for their work in Asian cancer genomics. Their research has led to strategies for the prevention of Asian cancers, improved diagnosis and treatment. ST PHOTOS: SEAH KWANG PENG

Graduate Medical School and A*Star's Genome Institute of Singapore (GIS); Professor Teh Bin Tean, 50, from the National Cancer Centre Singapore; and Professor Steven Rozen, 64, from the Duke-NUS Graduate Medical School, for their work in Asian cancer genomics.

Their research, which involves decoding Asian cancers for potential cures, has led to strategies for the improved diagnosis, treatment and prevention of these cancers.

Professor Neal Chung Tai-Shung, 64, from the National University of Singapore (NUS), won the President's Technology Award for his innovative research on membranes that have benefits that range from protecting public health to making desalination more environmentally friendly and effective.

Mr S. Iswaran, Minister in the Prime Minister's Office, gave the Young Scientist Awards to four researchers under the age of 35: NUS assistant professors Goki Eda and Yvonne Tay; Nanyang Technological University assistant professor Nripan Mathews; and Dr Wan Yue from A*Star's GIS.

Mr Iswaran, who is also Second Minister for Home Affairs and Trade and Industry, said the "world-class talent base" that Singapore has built at its public research institutions, universities and hospitals has been key to its research and development efforts.

He added: "We will continue to nurture a pipeline of local talent, complemented by a rich diversity of international researchers."

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Teaming up to prevent Asian cancers

Recognising that Asia will be most affected by cancer in the coming two decades, a team of experts from various fields got together eight years ago to explore Asian cancer genomics.

The team is made up of cancer and stem cell specialists Professor Patrick Tan from the Duke-NUS Graduate Medical School Singapore and Genome Institute of Singapore, Professor Teh Bin Tean from the National Cancer Centre Singapore and Professor Steven Rozen, a cancer bioinformatics expert, also from Duke-NUS.

Says Prof Tan: "By putting the right team together, one can do much better than individually. As a team, you can move on from good science to great science."

Over the past eight years, these scientists have pursued multi-disciplinary and collaborative "team-science". Using innovative genomic platforms and biological approaches including next-generation sequencing, they have studied the genomes of Asian cancers, identifying novel targets for improved therapeutics and diagnostics.

These efforts have garnered them the President's Science Award.



Innovative strides into cancer research have garnered the team of Professors Patrick Tan, Steven Rozen and Teh Bin Tean the President's Science Award.

"Over the next 20 years, the burden of cancer will shift to Asia. About 70 per cent of cancer deaths are predicted to happen in Asia and other developing countries — that is our backyard."

Many of the Asian cancers that they studied are caused by very specific exposures such as toxins and infections; and hence gave them the impetus to study the interaction between how the environment changes the host cell to cause cancer.

"Some of the work we have done allows us to look at the genes that are disrupted in the cancer and then to tell you what caused the cancer in the first place," says Prof Tan.

By understanding the possible environmental causes, the team's ultimate goal is to prevent certain cancers from occurring in the future. — APRIL CHONG

Paving the way for future scientists



President's Technology Award winner Professor Neal Chung was honoured for his breakthrough in membrane technology.

At the Department of Chemical & Biomolecular Engineering, National University of Singapore (NUS), Professor Neal Chung and his team have developed a novel process for advanced high flux forward osmosis (FO) membranes.

The FO membranes surpass the performance of most conventional nanofiltration processes, achieving a 99.5 per cent rejection rate for heavy metal ions.

While the novel membrane technology was developed especially for water treatment by making desalination more energy efficient, the invention potentially provides a solution to wider global issues beyond waste water treatment — such as water shortages and groundwater contamination from pollutants.

"We'd like to see if we can commercialise a few more products to bring the impact to the society," says the dedicated mentor who has trained 55 doctoral students, 18 master's students and more than 70 post-doctorate fellows students.

"I always told my students, 'your success is my success, my success is your success'. If a professor is

selfish, then there is no hope — a professor not only has to work hard but also should add value to the students, to nurture a better next generation," he adds.

Although now recognised as a membrane "scientist", as the recipient of this year's prestigious President's Technology Award, Prof Chung began as a polymer engineer.

His area of expertise gave him an advantage when making the transition to research on membranes, as many are made from polymers.

He says: "Most membrane scientists buy the membranes that they test, but I make the membranes myself. I have better advantage than most membrane scientists because I know polymer materials well and how to fabricate them."

The fibre ultrafiltration membrane he co-invented with Hyflux back in 2004 to 2008, for instance, protects public health through the use of stringent filtration methods to remove viruses and other contaminants.

Today, the technology is so successful that it is not only used in Singapore's water recycling plants, but also as a pre-treatment in large seawater reverse osmosis plants worldwide. — APRIL CHONG

who have made outstanding contributions to research & development resulting in significant technology with industrial applications.

Young Scientist Awards

The Young Scientist Awards (YSA) recognise young researchers, aged 35 years and below, who are actively engaged in R&D in Singapore, and who have shown great potential to be world-class researchers in their fields of expertise. This award is organised by the Singapore National Academy of Science (SNAS) and supported by A*Star. The 2015 winners are:

PHYSICAL, INFORMATION & ENGINEERING SCIENCES



Dr Eda Goki
(Department of Physics, NUS)

For his research on the fundamental properties of two-dimensional materials



Dr Nripan Mathews
(School of Materials Science & Engineering, NTU)

For his efforts in the development of novel electronic materials, devices as well as their fundamental optical and electronic exploration

BIOLOGICAL & BIOMEDICAL SCIENCES



Dr Yvonne Tay
(Department of Biochemistry, NUS)

For her research on non-coding RNA networks in cancer



Dr Wan Yue
(Genome Institute of Singapore, A*STAR)

For her research on using RNA structure analysis to identify new drug targets in pathogens