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Bright sparks shine at Singapore's top science awards

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The winners of this year's National Science and Technology Awards hail from various disciplines such as biomedical sciences, IT and maths. But they share something in common - great aptitude in science. TANIA TAN speaks to some of them

He bags top prize two years after winning the Young Scientist award

HE'S done it again.

Dr Ng Huck Hui of the Genome Institute of Singapore (GIS) yesterday received the Republic's highest science honour, becoming one of the youngest recipients in the award's 16-year history.

Dr Ng, 36, the winner of this year's National Science Award, had, two years ago, also taken home the Young Scientist award - the NSA equivalent given to scientists younger than 35.

That was when he first embarked on understanding what makes a stem cell a stem cell. Two years on, the project has borne fruit.

Using the latest technology, he and his team at GIS have unravelled the genetic controls that make a stem cell by identifying over 3,000 components. There were only four known targets when they began their research in 2005.

Stem cells are the precursors to all other cells, and can divide into any type of cell - making them prized for research and clinical treatments.

To date, Dr Ng's publications have registered over 4,000 citations - showing how significant it is, since other scientists build on it in their own research.

His passion for science started early. He spent his primary school years chalking up certificates and badges through the Young Scientist programme - which sees pupils doing experiments to earn points for badges in various scientific disciplines.

'But science isn't about awards,' said Dr Ng, who is married with two boys aged 2-1/2 years and seven months old.

'It's about the power to find answers.'

Now, having known what makes stem cells tick, Dr Ng and his team hope to make the next leap - turning normal cells into stem cells. This would potentially allow people to harness their own stem cells for treatments.

With laboratories across the globe working on similar areas of research, Dr Ng believes that having patients actively involved is not far-fetched, and that answers could become available within the next five years.

'With technology, such possibilities are no longer science fiction,' said Dr Ng.

He laments, however, about not being able to find an answer to stress-related hair loss, which afflicts him.

'Science can be stressful,' he chuckles, rubbing his head.

Turning phone lines into super-fast Internet links

DIAL-UP used to mean sluggish Internet connections, and hours wasted in downloading from the Net.

But the winners of this year's National Technology Award already have the power to turn phone lines into high-speed Internet connections, allowing users to race along on the information superhighway.

The local team from European semiconductor company Infineon Technologies Asia Pacific successfully developed a complete Very High Speed Digital Subscriber Line (VDSL2) system - and it is already being used in Germany.

Fed up with the 'hours it takes to load vacation photos onto the Internet', Mr Raj Kumar Jain and his team decided to take matters into their own hands.

After four years of research, the four-man team developed a microchip - one which can be fitted onto existing phone lines - that provides up to 250 megabytes of data per second (Mbps).

Current Internet speeds border at about 100Mbps, with the time it takes to transfer information online lagging behind download speeds.

VDSL2 allows for equal upload and download speeds, said Mr Jain.

Even better news for home users - high speeds are guaranteed.

This is because, unlike cable modem connections which serve several households at once, the system taps existing telephone lines, which run directly to each home. So, users need not share their bandwidth with others, explained Mr Jain.

Europe's largest telecommunications provider, Deutsche Telekom, has been setting up Infineon's high-speed system in German households since June last year, with plans to market the product to the rest of Europe.

Users here have yet to enjoy such must-have high speeds, but Mr Jain said local providers are 'evaluating' the system.

Fine-tuning music files for audiophiles

IF CRYSTAL clear digital sound quality can be had in today's tiny storage devices, that would be music to any audiophile's ears.

This could become a reality if researchers from the Institute of Infocomm Research succeed in bringing their audio compression technology to the market.

The institute, one of the winners of this year's National Technology Award, the nation's highest honour, is already in talks with one of the top 'US-based music distributors', said Mr Huang Haibin, senior research engineer at the institute.

The four-man team spent four years fine-tuning the Advanced Audio Zip (AAZ) system which allows users to pack and unpack music files without data loss or distortion.

The best part is that the system is 'scaleable'. This means that the sound quality can be automatically adjusted to fit the capacity of its 'container' which could be anything from a tiny MP3 player to a computer.

Current compression systems can lead to data loss of up to 90 per cent, although most of this is 'imperceptible to the user', explained Mr Huang.

Aside from a better listening experience, AAZ can change the way music is purchased online.

Currently, most online stores offer 30-second preview clips of songs to prevent piracy.

'But you don't get much in 30 seconds,' said Mr Huang. 'It's difficult to tell whether you really like the song in that time.'

With the AAZ software, companies can offer the full song at a low quality which users can listen to for free, and purchase a better quality version later.

Young Scientist Award winner inspired by his wife - also a scientist

WHILE many couples coo sweet nothings when together, Dr Yu Fengwei and his wife Dr Wang Hongyan will be passionately discussing asymmetrical stem cell division.

Such is their love for science, and it has paid off.

Both received top recognition for their work recently, with Dr Yu clinching the Young Scientist Award (YSA) while Dr Wang had a paper published in the September edition of Nature, one of the world's top scientific journals.

As fellow scientists at Temasek Life Sciences Laboratory, they often find themselves discussing - even at home - scientific concepts and hypotheses, especially when they hit a snag in their research.

'She gives me inspiration,' said Dr Yu.

'I regard him as a great scientist,' she replied.

For doing great science, Dr Yu was honoured yesterday at the annual National Science and Technology Awards.

Administered by the Singapore National Academy of Science, the YSA is given to young researchers below the age of 35 who show great potential in becoming world-class researchers in their respective fields.

Dr Yu's work opens up a new field of research in asymmetric division within cells of the nervous system, including the study of genes linked to Parkinson's disease, a common neurological disorder.

His achievements have already gained international recognition, having been cited in prestigious scientific journals like Cell, Science and Nature Cell Biology.

But his biggest achievement so far? His family.

'I'm very proud of him,' said his wife, Dr Wang.

And the winners are...

NATIONAL SCIENCE AWARD

Dr Ng Huck Hui

Genome Institute of Singapore, Agency for Science, Technology and Research (A*Star); Department of Biological Sciences, National University of Singapore (NUS)

For uncovering the remote controls that manipulate stem cells

Associate Professor Uttam Surana

Institute of Molecular and Cell Biology, A*Star

For discovering novel cell cycle regulation patterns and redefining fundamental concepts in cell division

Professor Jon Berrick and

Associate Professor Wu Jie

Department of Mathematics, NUS

For drawing fundamental connections between different areas of math-algebraic topology (the study of the shapes of geometric objects) and braid theory. Their findings can be applied to anything from air traffic control to drug creation

NATIONAL TECHNOLOGY AWARD

Dr Susanto Raharja,

Dr Yu Rongshan,

Dr Lin Xiao and

Mr Huang Haibin

Institute of Infocomm Research, A*Star

For developing a means of loss-free audio data compression that can be automatically scaled to fit different memory sizes

Mr Raj Kumar Jain,

Dr Sim Hak Keong,

Dr Goh Chee Kiang and

Mr Teo Tee Yong

Infineon Technologies Asia Pacific

For developing a broadband communication system that allows high-speed uploads and downloads. Their system is already being used in Germany and South Korea

SINGAPORE NATIONAL ACADEMY OF SCIENCE YOUNG SCIENTIST AWARD

Dr Yu Fengwei

Temasek Life Sciences Laboratory

For shedding new light on asymmetric cell division, which can be used to better understand neurological disorders such as Parkinson's disease

Assistant Professor Ng How Yong

Division of Environmental Science and Engineering, NUS

For developing novel filtration membranes that can be used for the production of ultra-clean water, and the production of clean energy using fuel cells powered by micro-organisms

The winners of this year's National Science and Technology Awards will be giving a lecture about their prize projects from 9am to 3pm on Sept 20 at the Breakthrough Theatre, Matrix Building Level 3, Biopolis.

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