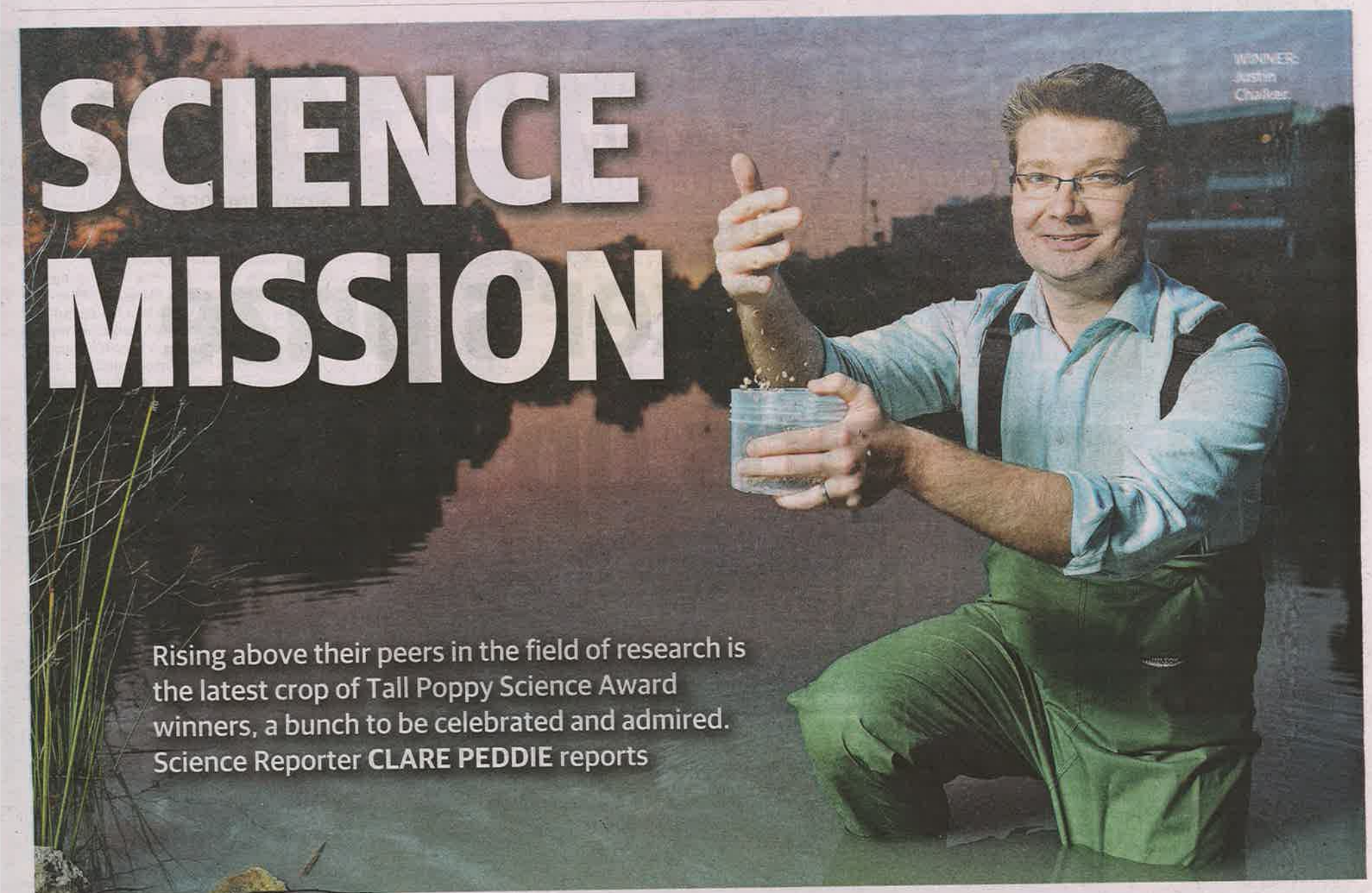
SCIENCE MISSION



Rising above their peers in the field of research is the latest crop of Tall Poppy Science Award winners, a bunch to be celebrated and admired. Science Reporter **CLARE PEDDIE** reports

A NEW type of rubber that mops up mercury is the latest problem-solving product to emerge from the Chalker Research Lab at Flinders University –but it won't be the last.

Lab head and synthetic chemistry lecturer Dr Justin Chalker is working through a long list of "grand challenges in sustainability, biochemistry and medicine".

Which makes him an ideal candidate for one of the Tall Poppy Awards, announced today, in recognition of scientific achievement.

"We design reactions and methods to make valuable molecules, even new molecules that have never existed before," Dr Chalker says.

"We want them to be used in various areas, whether it's medicine, biology, environmental science."

He's studying a "new type of molecule that can reveal biomarkers for diabetes, cancer and ageing in cells". Then there's a biodegradable wound dressing made from seaweed.

And that "exciting" rubber, made entirely from waste sulphur and plant oils, "that's great for packing into a filter, so if you have water or air pass through it, it can capture mercury".

NINE OF OUR BEST

2016 SA YOUNG TALL POPPY SCIENCE AWARD WINNERS

Dr Justin Chalker, Flinders University
Organic chemistry: Detecting disease using new diagnostic tools; creating biodegradable wound dressings for burns victims; and cleaning mercury pollution.

Dr Luke Bennetts, University of Adelaide
Theoretical and applied mathematics: Studying waves of sound, light or water using computer models and laboratory experiments. Dr Bennett is predicting how water moves into frozen oceans.

Dr Camille Short, University of Adelaide
Behavioural medicine: Increasing physical activity using interactive websites and apps for groups such as cancer survivors or rural communities.

Dr Lyndsey Collins-Praino, University of Adelaide
Neuroscience: Developing treatments for Parkinson's disease by investigating the role of brain inflammation in cognitive impairment – when a person has trouble remembering, learning new things or making decisions.

Dr Nicole Lovato, Flinders University
Sleep and circadian rhythms: Preventing sleep disorders such as insomnia and associated mental health problems including suicide in adolescence. Dr Lovato is improving the effectiveness of therapies with a focus on the body clock and sleep quality.

Dr Tom Raimondo, University of South Australia
Geology and geochemistry: Examining the MacDonnell Ranges. Dr Raimondo's research has implications for geothermal energy, climate change and nuclear waste storage.

Dr John Arnold, the University of South Australia
Podiatry: Investigating foot pain in osteoarthritis, a condition that destroys the joints of the foot, causing trouble with balance, walking and daily activities. Dr Arnold is trying to determine why these joints break down, and how it can be stopped.

Dr Heidi Alleway, Primary Industries and Regions SA
Marine ecology: Using historical records such as pioneer diaries and old newspapers to study how the environment has changed. Dr Alleway created the online platform 'A History of Fish' to connect researchers with the public.

Dr Susan Wood, University of Adelaide and SAHMRI,
Cancer research: Unravelling gastrointestinal cancer at the molecular level. Dr Wood is testing a new drug in a mouse model of colorectal cancer, targeting cells that help the gut lining to grow.

Dr Chalker said the problem of mercury pollution was "really a global crisis".

The potent neurotoxin is produced during the processing of natural gas or crude oil, in burning coal and in the decommissioning of industrial facilities that make sodium hydroxide or lime. But it's the intentional use of mercury, in small-scale "artisanal" gold mining overseas that Dr Chalker finds most disturbing.

He says 15 to 20 million people are involved directly plus many more indirectly, when excess mercury runs off into waterways used for drinking and irrigation.

Exposure to the metal, even in small amounts, can cause irreversible brain damage and Dr Chalker believes workers' families suffer high infant mortality rates, while surviving children can have stunted growth.

The lab is negotiating access to mines in Indonesia for field testing of the potentially lifesaving product.

The Australian Institute of Policy and Science created the awards to both celebrate high achievers and encourage youngsters to follow in their footsteps.

"In 1998 the State celebrated the centenary of the birth of the great South Australian scientist Lord Howard Florey who shared a Nobel prize for his work on penicillin," the website states.

"Despite his invaluable contribution to society Lord Florey and his work did and to a point, still do remain largely unknown in the wider community. This situation is representative of the so-called "Tall Poppy Syndrome' — the tendency to celebrate success in some fields yet to ignore or even mock excellence and achievement in other fields."

Dr Chalker is one of nine Tall Poppies to receive awards this afternoon at Government House. An overall winner will be announced at the Science Excellence Awards on Friday August 12.

Some zaps while you nap improves memory, researchers find

FIONA MACRAE

ZAPPING the brain with electricity during sleep may help improve memory, research suggests.

Volunteers in a study had a gentle current passed into their brain at the same time as their sleep spindles – which are natural bursts of brain activity while we are asleep.

The next day, most performed better in a memory test than after a night's sleep without the electricity therapy.

The US scientists say their discovery raises the prospect that conditions such as Alzheimer's and schizophrenia could be treated non-invasively as patients sleep. Simple absent-mindedness could also be gently zapped away.

A spokesman for the team said: 'The findings offer a non-invasive method to potentially help millions of people."

However, British experts were more cautious, saying it is too early to get excited about the results.

The zapping technique, called trans-cranial alternating current stimulation, or tACS, involves placing electrodes at key points on a person's scalp and then passing through them a tiny alternating current – where the electric flow repeatedly changes direction – to stimulate the brain.

It is thought that this technique, by targeting certain processes in the brain, can enhance particular skills such as creativity and dexterity. The study focused on memory.