

Exhibition Installation: Art and Genetics
Project 2017 Exhibition

The Project for 2017 was self-selected, as the University of Otago is hosting the Genetics Society of Australasia Annual Conference, together with the New Zealand Society for Biochemistry and Molecular Biology. It is always hoped that not only artists and scientists can gain from this creative association, extending their respective cognitive and visual worlds, but that they can both offer the public, the community in which the artists and scientists work and live, as well as future artists and scientists—young people of today—an opportunity and incentive to look afresh, or anew, into aspects of their own bodies or worlds of enquiry to which they had previously paid little attention - Peter Stupples and Dr Ruth Napper, 2017.

All measurements are in centimetres except where indicated. Photographs by Pam McKinlay.

TYLER MCINNES AND ANNEMARIE HOPE-CROSS

Number 1 - 2. Annemarie Hope-Cross, *Hope*, 2017, cyanotype with gold leaf, Image: 84.0 x 59.4.

Tyler's work profiles DNA methylation in colon cancer, and comparing it to the DNA methylation profiles of healthy tissue. DNA methylation works like a padlock - it shuts down a piece of DNA and makes sure that it cannot be read or activated. Like DNA, music is a set of instructions. How fast or slow to play an instrument, which notes to play, and how loudly or softly, and when to stop. Annemarie has used this analogy to reinterpret the work Tyler is doing.

ANN-KATHRIN SCHLESSELMANN AND BECKY CAMERON

Number 3 - 5. Becky Cameron, *a delicate balance* (detail), 2017, paper, wire, aluminium, ~150 x 100 x 100.

Black-fronted terns, tara pirohe, are as unique to New Zealand as the more famous counterparts like kiwi or kea. Unfortunately, terns are in decline and are currently classified as Endangered. Their habitat is under threat due to water abstraction and invasive weeds, and black-fronted terns have low breeding success due to introduced and increasing number of native predators. In creating a

hanging mobile in response to Ann's research, Becky wanted to reflect their interconnectivity, and also their fragility and vulnerability. In the work presented here, a flock of fragile paper terns hang in an uneasy and shifting balance with a single black-backed gull.

MACKENZIE LOVEGROVE AND BRITTANY SUE MASON

Number 6 - 8. Brittany Sue Mason, *Honeycomb Necklace*, 2017, bronze, sterling silver, glass, beeswax.

Brittany Sue Mason, Mackenzie Lovegrove's project involves trying to understand how honeybees evolved "eusociality" – the social structure where one female reproduces and the others rear her offspring. In a bee hive, the queen lays eggs and produces a pheromone (a chemical cue) that stops all of her daughters from reproducing. Brittany's interest in apiculture inspired her to create jewellery as a type of non-verbal form of communication.

NATALIE FORSDICK AND MICHELLE WILKINSON

Number 9 - 10. Michelle Wilkinson, *A Conglomeration of Stilts: MW2017-01-01, Pure Poaka* (left), *MW2017-01-09 Pure Kakī* (right), 2017, fine silver, 925 silver, copper, aluminium, heat shrink tube, polymer clay, resin, steel pin. Series of nine broaches, each 15.0 x 5.0 x 1.0.

In this collaboration, Natalie and Michelle investigated hybridisation between an endemic endangered New Zealand bird, the Kakī (Black Stilt) and the self-introduced Poaka (Pied Stilt). When Kakī numbers have been historically low, interbreeding between the two species has occurred, and has resulted in fertile hybrids that display a range of plumage nodes intermediate to those of the pure black Kakī and the mixed white and black Poaka. Each brooch depicts the black and white plumage of the birds on the front, and the back, which represents the hidden, genetic profile of each, is made from a different metal alloy: pure silver for the Kakī, pure copper for the Poaka, and varying proportions of silver/copper alloy for the hybrid birds.

DAVID HUTCHINSON AND CHANEL TAYLOR

Number 11. Chanel Taylor, *Journeys* (detail), 2017, watercolour, perspex, digital print of scanned watercolour on Perspex. Various dimensions.

In 2007, long-lived coherences in exciton transport were observed in the Fenna-Mathews-Olsen (FMO) complex. FMO is a protein complex found in light-harvesting green sulphur bacteria, and is responsible for the transfer of energy from the antenna to the reaction centre in photosynthesis. It does this with near unity efficiency. The implication is that perhaps nature could have utilized quantum effects to enhance energy transport. Chanel's work imagines what the inside of green sulphur bacteria might look like, especially in regard to the FMO complex and represents the simultaneous pathways the exciton takes on its journey to the reaction centre.

PADMINI PARSATHARATHY AND JOSEPHINE WARING

Number 12. Josephine Waring, *The Answers Lie Within Our Hands*, 2017, ceramics, map.

The work in this exhibition was made in conjunction with Padmini Parthasarathy, from the Department of Biochemistry who is currently researching the SLC2A9 gene. Gout, a painful inflammatory arthritis, is highly prevalent in the New Zealand Māori and Pacific (Polynesian) people. The basic pathophysiological feature of gout is the deposition of monosodium urate crystals in the synovial fluid of the joints following longstanding hyperuricemia (elevated blood urate levels). Hands are probably our most important tool, and we describe them in many different ways: large, strong, capable, warm, cold, limp, small, slender, elegant, lady-like, delicate, work-worn, arthritic.

MEGAN GRIFFITHS - GUEST ARTIST

Number 13. Megan Griffiths, *Who am I?*, 2015, synthetic fabric, acrylic, 196 x 60.

Who am I? is an art work exploring the inexorable decline of memory and abilities of people facing dementia or Alzheimer's disease. The cause of late onset Alzheimer's Disease is not yet well understood, as it is likely a combination of genetic, environmental, and lifestyle factors that affect a person's risk for developing the disease.

IAIN LAMONT AND SUE NUNN

Number 14 - 15. Sue Nunn, *Beauty is the Beast*, 2017, fabric, polyester batting, cardboard, assorted threads, beads and sequins, ~250 x 150.

Cystic fibrosis is the most common inherited disease in New Zealand. Sufferers have a range of symptoms that are managed with medications, regular physiotherapy and hospitalisation if required. The lungs develop a thick sticky mucus that can become infected by *Pseudomonas aeruginosa* bacteria. These infections are difficult to cure, affecting the general health of those with the disease. In this artwork, Sue Nunn hopes to draw a parallel between science and cystic fibrosis by using a series of words CF sufferers have provided. The beauty of the bacteria growing in the lab is in stark contrast to the ugliness of how it manifests itself in cystic fibrosis sufferers.

NICOLA DENNIS AND EMILY DAVIDSON

Number 16 - 18. Emily Davidson, *Genetic Interpreter* (detail), 2017, wood, paint, noise, data

Nicola's work involves building mathematical models. In general, science results in the generation of meaningful numbers that explain a tiny piece of the world around us. On their own, these numbers are useful to a small number of people but collectively these numbers can do more. The collaboration between Emily and Nicola translated information between different forms and which operated by means of 'breeding' data and seeing what came of it.

DENISE MARTINI AND ERIC SCHUSSER

Number 19. Eric Schusser, *Kākā Genetics* (detail), 2017, grid of 35 pigment print photographs on archival paper. Each photograph 19.5 x 29.0.

The kākā is a large forest parrot that is only found in New Zealand. Kākā used to be extremely abundant and widespread, but numbers have declined sharply in the past 150 years. Genetic diversity is an important predictor of the overall health and potential for the lasting survival of a species. Conservation genetics is a branch of biology that investigates genetic diversity in endangered species. Denise's project aims at investigating the modern and historical genetic diversity of kākā across its geographical distribution, in order to support its current and long-term future management.

EMMA WYETH AND HERAMAAHINA EKETONE

Number 20. Heramaahina Eketone, *Te pūrākau tūtahi (The Whole Story)*, 217 drawing) ink on paper.

Dr Wyeth teaches and conducts research into Māori Public Health. Her undergraduate and post-graduate studies were in genetics, focusing on Māori views of science, specifically including genetic research. Tikanga provides a framework through which Māori engage with ethical issues and consider the effects research have on their cultural values and relationships.

JULIA HORSFIELD AND CHRISTINE KELLER / PAM MCKINLAY

Number 21. Christine Keller / Pam McKinlay, *Heir Loom* (detail), 2017, merino wool, hand woven on counterbalance loom.

A recently fertilised embryo contains rapidly dividing cells that have the potential to develop into any part of the body. One of life's biggest mysteries is how cells in the early embryo decide what to be. Cohesin is a large ring-shaped multi-protein that encircles DNA. In doing so, it can organize loops of DNA in the nucleus. The clustering can be measured by looking at the contacts between DNA sections, and this is visualized by a red-and-white 'heatmap'.

JULIA HORSFIELD AND PAM MCKINLAY / JESSE-JAMES PICKERY

Number 22 - 25. Pam McKinlay / Jesse-James Pickery, *He puira hirahira (A Special Chromosome)*, 2017. Muehlenbeckia, muka, three gauges of monofilament, plaster mask and *Pungao o te Ira (Energy of the Genes)*, digital moving image.

Cohesin proteins are essential for both chromosome duplication and for controlling the expression of specific developmental genes influencing how genes switch on or off. McKinlay and Pickery imagined an unfolding chromosome, the unravelling of DNA, bound into a rigid shape, at the moment of stasis - some sections closed in the twist of the double helix and sections with free roaming loops in space and time. Bindings, interstices and flashing between them the fleeting web of cellular communication.

MIKE PAULIN AND DAVID GREEN

Number 26. David Green, *Tyger Tyger*, 2017, single channel video, MOS.

Organisms are constructed from a small set of structural motifs that emerge spontaneously in fluids and soft materials. Now armed with automated sequencing machines and supercomputers, we can simulate the molecular networks that operate during the development of whole organisms. This is such a spectacular achievement that we may be forgiven for not noticing, or at least not mentioning, that it does not explain how morphology arises during development. David's work creates a world of *pattern formation and animal morphogenesis*.

NATALIE FORSDICK AND MADISON KELLY

Number 27 - 29. Madison Kelly, *Kakī Reared and Sampled* (detail), 2017, charcoal and shelves on gallery wall, ~100 x 40.

The key concept behind much of conservation genetics is fairly simple – that small population size may result in low genetic variation, and consequently, reduced ability of the population to adapt to future change. Consequences of inbreeding, hybridisation, and population isolation all build on this main concept. The drawings by Madison are exercises in finding physical analogues for the urgency permeating conservation genetics, as well as the restriction, hybridisation, and impermanence facing the Kakī population.

TANYA MAJOR AND MARION WASSENAAR

Number 30 - 31. Marion Wasseenaar, *Ties That Bind*, 2017, mixed media, four framed works.

Gout is a distressing health problem in Aotearoa, New Zealand, affecting an increasing number of (mainly) New Zealand Māori and Pacific Island men, with South Auckland now regarded as 'the gout capital of the world'. Gout is a serious and debilitating type of arthritis. Gout attacks are excruciatingly painful and happen sporadically. If left untreated gout can destroy joints and lead to significant disability. Gout is an inherited condition. Someone with a family history of gout is twice as likely to develop gout compared to someone with no family history of gout. This is because gout is a genetic disease.

ADAM RANCE AND VICTORIA MCINTOSH

Number 32 - 33. Victoria McIntosh, "*Chapter 30: Diseases Peculiar to Women*"*, 2017, vintage foundation garment, fabric and stitch, 86.0 x 38.0 cm

Adam Rance is currently investigating the role of Anrogen Receptor signaling in Triple Negative Breast Cancer. This is a highly aggressive subtype of breast cancer diagnosed in 10-25% of patients, leaving no established options for systemic therapy other than chemotherapy. Victoria McIntosh's work looks at body image, aging and the damaged body. Her foundation garment work was a way of bringing the whole body back into view after spending time in Adam's laboratory where research is conducted at the cellular level.

NATALIE FORSDICK AND BRIGETTE KAMMLEIN

Number 34. Brigitte Kammllein, *Kakī, On the Cutting Edge*, 2017, woodcut, drypoint, solar etching and coloured pencils on Fabriano paper, 62.0 x 36.0.

Accurate information is essential for species conservation, allowing appropriate decision-making not just to prevent extinctions, but to ensure species recovery. The Kakī (Black Stilt) is considered to be the world's rarest wading bird, and had declined to around 23 birds in 1981. Kakī are black, long-legged members of the avocet and stilt family, they have black bills, crimson legs and because they are so few, they hybridise with the pied stilt. Without the management of DoC and further research, only about 1% of all black stilt eggs laid in the wild would survive to reproduce.

AARON JEFFS AND JOHANNA ZELLMER

Number 35 - 37. Johanna Zellmer, *ACCess mATTers - Trio* (detail), 2017, San Marino Commemorative Sterling Silver 10 Euro coin: 2004 Summer Olympics Athens, forged, stamped and punched; various Illumina flow cells, cut and fused. 180 x 105 x 2mm.

Genetics is the study of heredity, and how the transmission of the genes encoded within our DNA from one generation to the next contributes to normal health and development. DNA stores biological information; knowing someone's DNA sequence allows geneticists to identify the differences between individuals that make us who we are. Sequencing entire populations allows advances in diagnosing and treating disease. DNA sequence can also be used to trace ancestry and ethnicity, and personally identify an individual; information that can be used to exploit and alienate people for political, cultural, or religious reasons. Identity Politics offers a relevant insight into Johanna's work as a craft practitioner.

AMY DOWDLE AND JO ST BAKER

Number 38 - 39. Jo St Baker, *Awakening* (detail, *All for Love*), 2017, animated 1.49 min film loop projected on chiffon print scarf. Original painting: *All for Love*. Acrylic on canvas. 140 x 140.

From the beginning of life itself, development is directed by maternal factors left in the egg at the time of fertilisation; during this time, the embryo's own genes remain silent. As development progresses, the embryo awakens and switches on its genetic program. During this transition, the embryo truly comes of age: it begins to shut off the maternal influence as its own genes become active. Amy and Jo both interpreted the triggered switch as an analogy for flowering, blossoming, or transforming into an awakened state, likened to that of a child transitioning to adulthood.

MARTIN KENNEDY AND JULIE WHITEFIELD

Number 40 - 42. Julie Whitefield, *Above the Threshold* (detail), 2017, acrylic paint on MDF.
Part i: 175 x 45 cm x varying heights (85.5 - 138 cm). Part ii: 175 x 31 x 82.

For as long as the structure of DNA has been known, it has been used in art. This is part of the fascination with DNA, as the key molecule which underpins and transmits life, that makes it so alluring and prone to creative interpretation. The Manhattan plot is an icon of early 21st century human genetics, that Julie used this as a key theme for her work. In the world of genomics, data visualisation and presentation is both an art form and a vital key to understanding.



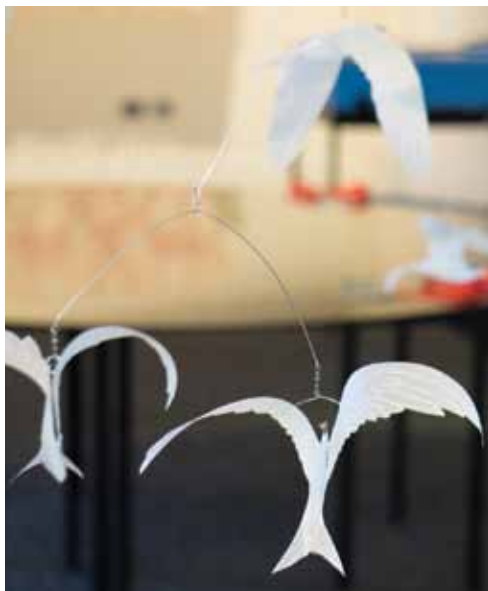
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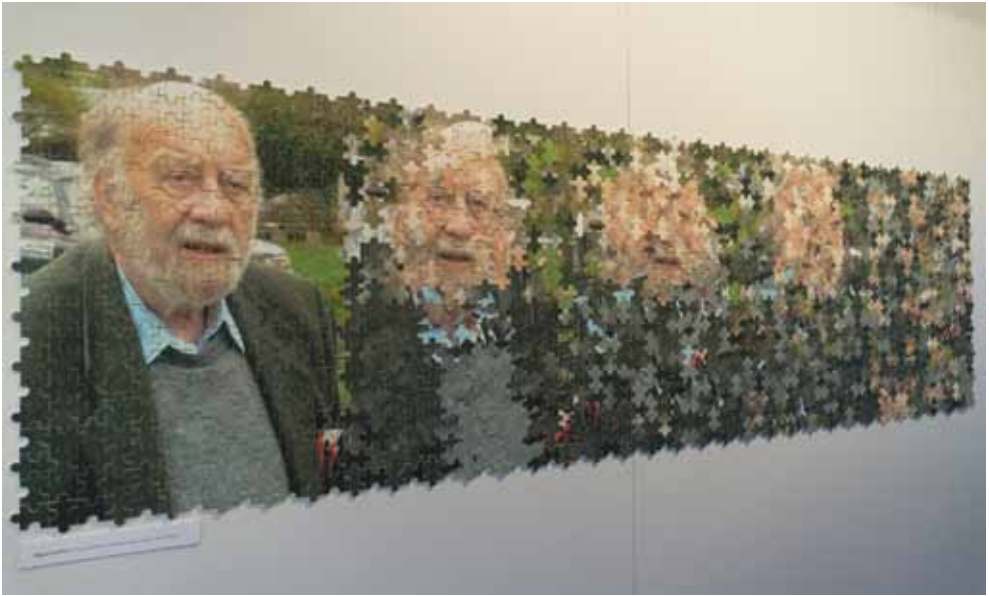
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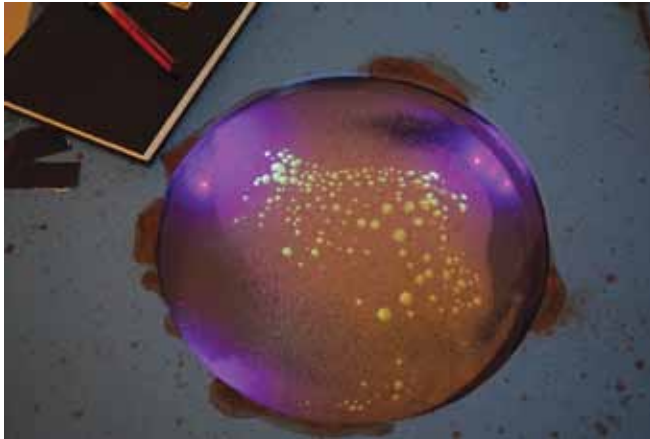
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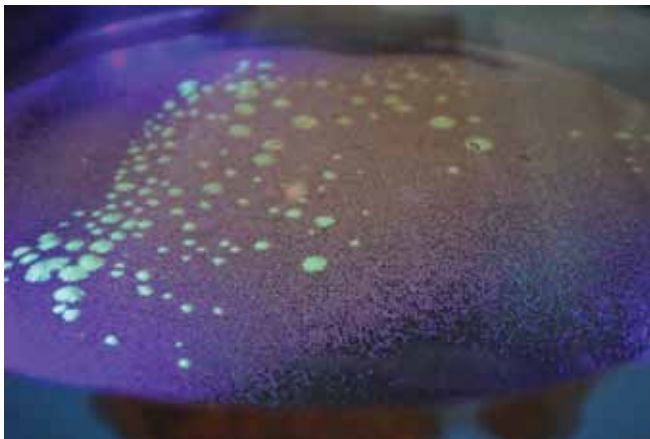
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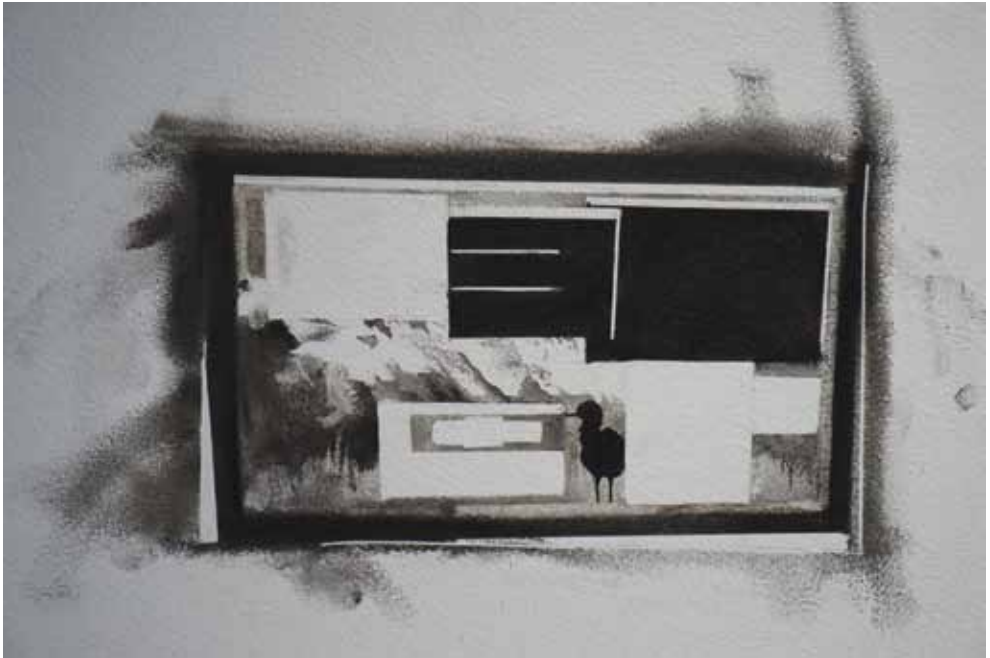
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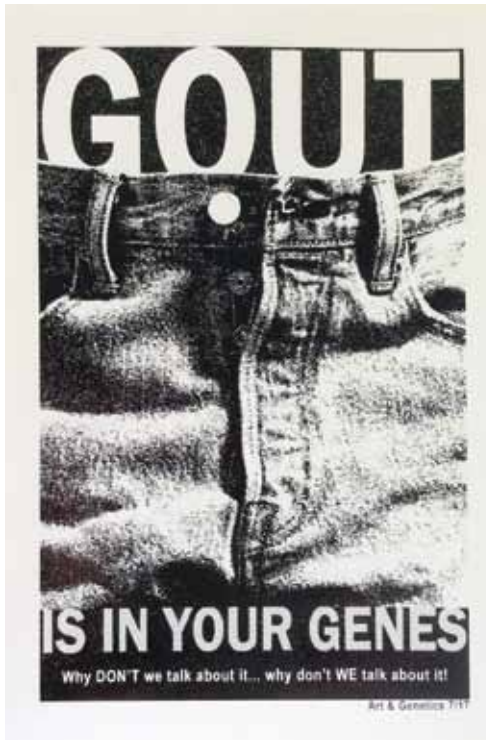
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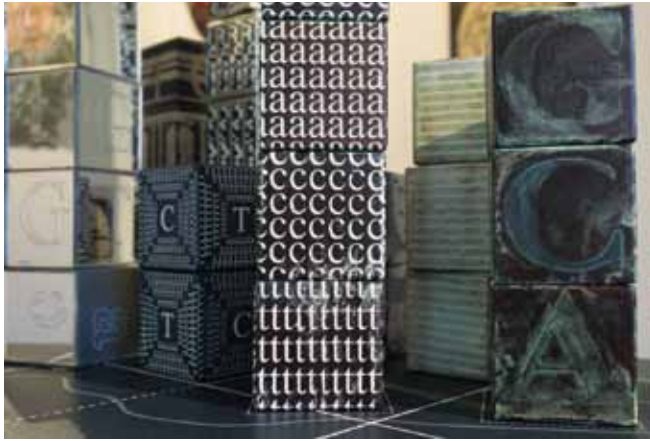
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