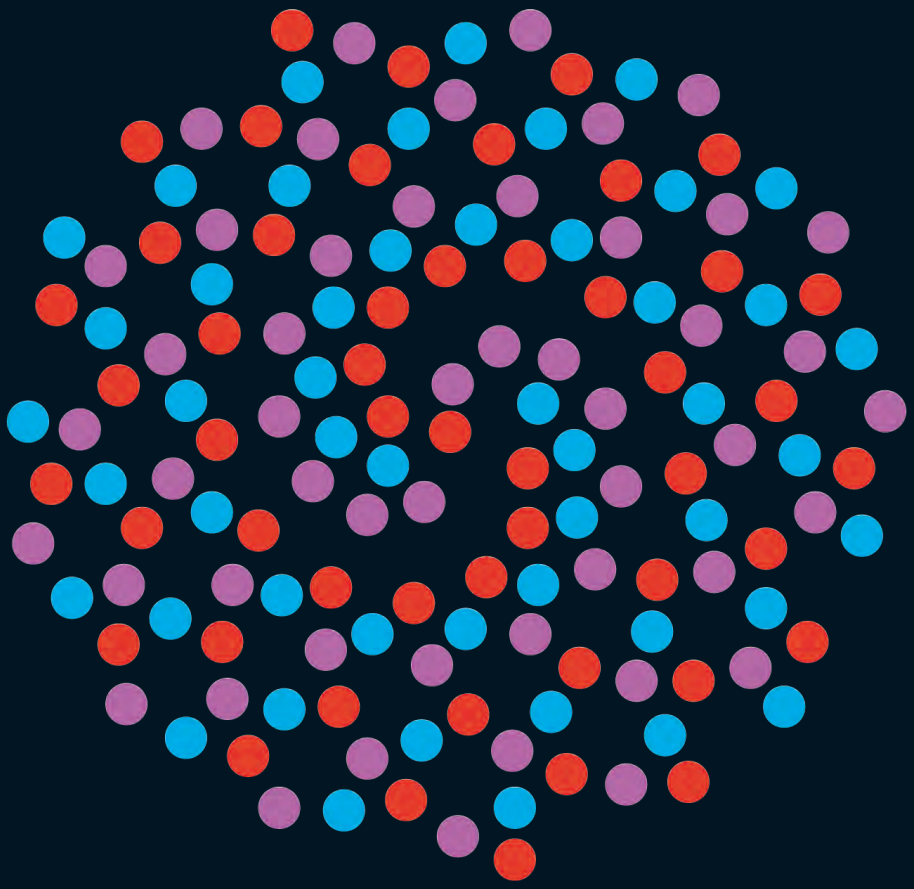

MAURICE WILKINS CENTRE

New Zealand's Centre of Research Excellence
targeting human disease

Annual Report 2013

Maurice Wilkins Centre

The Maurice Wilkins Centre is New Zealand's Centre of Research Excellence targeting major human diseases. It focuses on cancer, diabetes and infectious disease.

New Zealand has an outstanding reputation for biomedical research. The Centre aims to harness this expertise to develop drugs and vaccines, tools for early diagnosis and prevention, and new models of disease. In addition to translational research that directly targets human disease, the Maurice Wilkins Centre encourages innovative fundamental science that has the potential for high impact on human health.

The Maurice Wilkins Centre is a multidisciplinary network that brings together leading biologists, chemists and computer scientists. At the end of 2013 it comprised 148 investigators throughout the country, and over 170 early-career affiliates, linking researchers from six universities, three Crown Research Institutes and two private research institutes. These investigators represent most of New Zealand's expertise in discovering new drugs, vaccines and diagnostic tools that proceed to clinical trials.

As the national hub for molecular biodiscovery the Centre provides a point of contact for a broad range of national scientific expertise. It cultivates collaborations with international researchers and research institutions and also engages with industry and the medical profession.

For more information see www.mauricewilkinscentre.org

For more information on New Zealand Centres of Research Excellence see www.acore.ac.nz

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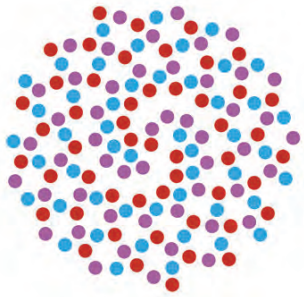
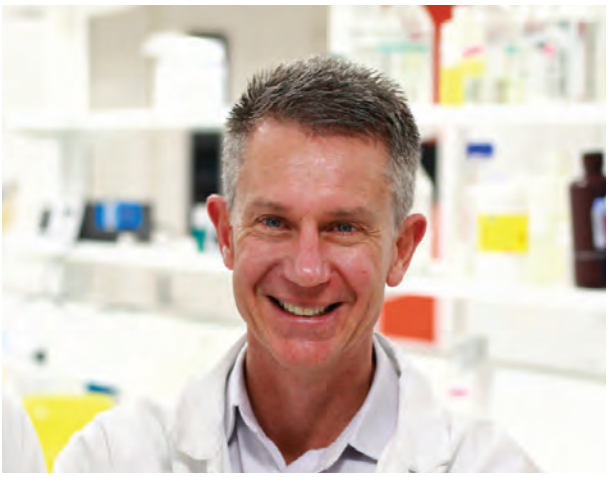


MAURICE WILKINS CENTRE
FOR MOLECULAR BIODISCOVERY

Director's Report



Once again our Annual Report starts with outstanding success for one of our principal investigators – the award of the 2014 Medicinal Chemistry Award from the American Chemical Society (ACS) to Professor Bill Denny. It's difficult to over-state the importance of this award. The ACS is a heavyweight in international science – the largest scientific organisation in the world. And for the first time in over 30 years, it has decided to make the award to someone outside the USA, cementing Bill's reputation as an international icon of medicinal chemistry. If there was an Olympic event in drug discovery, Bill has just become the first non-American to take out the gold medal, out of a stellar international field.

As you'll read in our Highlights story, Bill and his team have an extraordinary record of inventing new medicines. Fourteen of their drugs to date have progressed through to clinical trials in humans, after passing a battery of rigorous tests. This record places the Auckland Cancer Society Research Centre at the very top of the international organisations that discover new drugs. Yet all of this success came from a New Zealand base. In part this is due to Bill's unwavering belief that despite our size and remoteness from major markets, New Zealand can still carry out such a complex high-tech activity as well as anywhere else – provided we maintain our support for the world-class facilities and training that underpin excellent research. But it's also a tribute to Bill himself – a calm and efficient leader with a hard-won reputation for delivering research products that the world can trust. We're delighted to celebrate the award with Bill, and frankly, it really couldn't have happened to a nicer bloke.

Elsewhere in the report we celebrate other excellent research – from papers published in the world's leading journals to the discovery of new therapeutic agents that promise to relieve some of the burden of serious disease. We also report on our strategy as an organisation as we entered the highly competitive process for a further six-year funding cycle. Crucial to our response to the call for proposals from the Tertiary Education Commission was a vibrant, active network of collaborators across New Zealand.

The strength and reach of the Centre's network was never more evident than during the "flagship" process, where we convened meetings to develop national strategies for particular research themes (see Highlights story on TB, and section 4.5.2). The "flagship" meetings brought together our top 20 or so investigators under each theme, along with other key people our investigators wanted to talk to, such as New Zealand's leading clinicians in particular disease topics. After discussing the major challenges in each research field, and mapping New Zealand's research capability against those challenges, the teams produced focused plans of how that capability could most effectively be deployed. Part of this process involved eschewing their own parochial concerns in favour of a realistic examination of how their combined research firepower could best deliver progress against major disease in New Zealand. Such commitment to national goal setting has implications for resource allocation in future, and could only occur amongst researchers with a high level of engagement and trust, built up over many years of collaborative work. The strategies developed at these meetings were carried forward into our research proposal for 2015-2020. Importantly, many of the ideas incorporated into these strategies had already been road-tested internationally – through the investigators' own international collaborators, through review by the Centre's Scientific Advisory Board, and through international symposia (such as the Centre's joint TB meeting with Colorado State University in 2012). The Centre was therefore able to propose an exciting, world-class research programme addressing national goals that was only achievable because of the excellent national teams we had developed.

All of which may sound reminiscent of another initiative launched in 2013, the National Science Challenges. Centre investigators have already been deeply involved in these, particularly the "Healthier Lives" challenge. It has become very obvious that the research networks built up through the Centres of Research Excellence (CoREs) have become a crucial asset in addressing the major scientific challenges New Zealand faces. CoREs engage New Zealand's top researchers in a given field, build research capability, and incentivise collaboration across the country. When such highly collaborative networks turn their attention to a major challenge faced by New Zealand, they are well primed to plan and to deliver an integrated national approach, benchmarked against the world's best. The Maurice Wilkins Centre will therefore continue to explore synergies with the National Science Challenges. But the Centre will also continually examine how its outstanding "assets" such as Professor Bill Denny can deliver solutions to other national challenges, matching opportunities for impact with a precise understanding of what the best of New Zealand research can achieve.

Rod Dunbar

Director

Contribution to National Goals

The Centres of Research Excellence (CoREs) are collectively charged with making a contribution to national goals including fostering innovation and social and economic development. The CoREs will each contribute to these goals in different ways and in different proportions, depending on their particular research focus. The Maurice Wilkins Centre has its own unique place in this spectrum. Our focus on human disease is based on a multidisciplinary platform that extends across chemistry, biology and medicine and combines key approaches and technologies from physics, engineering and mathematics.

Innovation

The Maurice Wilkins Centre conducts highly innovative research and enables innovation in the wider research and business sector. Its goal is to become New Zealand's engine for the discovery of new therapies and diagnostic tests. Innovation in research is often to be found at the interface between disciplines, through cross-fertilisation of ideas and technology.

The Maurice Wilkins Centre brings together researchers from a range of disciplines to tackle complex questions that no one field alone could address. It also encourages a more collegial approach within the biomedical research sector in New Zealand. The Centre's work leads to the establishment of new spin-out companies and contributes directly to innovation within established companies through contract research, consultancy, and sharing of facilities and expertise. Fundamental scientific discoveries, novel technologies and management developed within the Centre enable new lines of research that advance understanding of human health and disease and also enable innovation in other sectors including New Zealand's primary industries.

Social development

One of the Maurice Wilkins Centre's contributions to social development in New Zealand is through improvements to human health. Our major focus is to improve the diagnosis and treatment of diseases such as cancer, diabetes, and infectious disease – all increasing challenges for New Zealand society. At the same time, science is an important aspect of our culture, and the Maurice Wilkins Centre plays a role in increasing the impact of science within New Zealand, as well as connecting us strongly to the international scientific community. The multi-disciplinary and collaborative ethos of the Maurice Wilkins Centre ensures an excellent training environment for graduate students and younger scientists, including exposure to the ethical, managerial and entrepreneurial aspects of translational science. It is particularly important for students at all levels of education to see that scientific research of the highest international quality can be done in New Zealand, and that it can make major contributions to the social and economic well-being of their country. The example set by Maurice Wilkins Centre leaders in choosing to return from research posts overseas, committed to carrying out world-class research in New Zealand, provides a powerful incentive for our top students to do likewise in future.

Economic development

The Maurice Wilkins Centre's focus on new approaches to human disease has dual importance for the New Zealand economy, in both improving health and providing direct economic gains. Centre investigators have to date been responsible for bringing a large portfolio of drugs to clinical trial, with a deep pipeline of new projects in pre-clinical development. This strong portfolio means that New Zealand maintains its exciting potential in the biopharmaceutical sector, one of the few economic sectors capable of driving explosive economic growth. The intimate links between the Maurice Wilkins Centre research programme and recent start-up companies demonstrates that research findings can and will be developed for the national good. Direct economic gains also come from international research contracts, and milestone and licensing revenue from overseas partnerships – effectively a "weightless" export industry. Less direct economic gains come from Maurice Wilkins Centre investigators' significant impact on the international rankings of our educational institutions, which affect their ability to attract international students.

The Centre also plays an important role in promoting and validating our national scientific capabilities abroad, increasing the reputation of New Zealand as a source of high-value research.

Professor Bill Denny participated in the inaugural Ride to Conquer Cancer to raise money for the Cancer Society Auckland.

Image courtesy of Wayne Martin/Howick and Pakuranga Times

Highlights

Major award for New Zealand drug inventor

This year Maurice Wilkins Centre principal investigator and Distinguished Professor Bill Denny received the American Chemical Society's 2014 Medicinal Chemistry Award.

It's the first time in 30 years that the award, which recognises outstanding achievement, has been given to someone from outside the United States. The American Chemical Society is the world's largest scientific society with over 163,000 members, and includes more than 24,000 international members from over 100 countries.

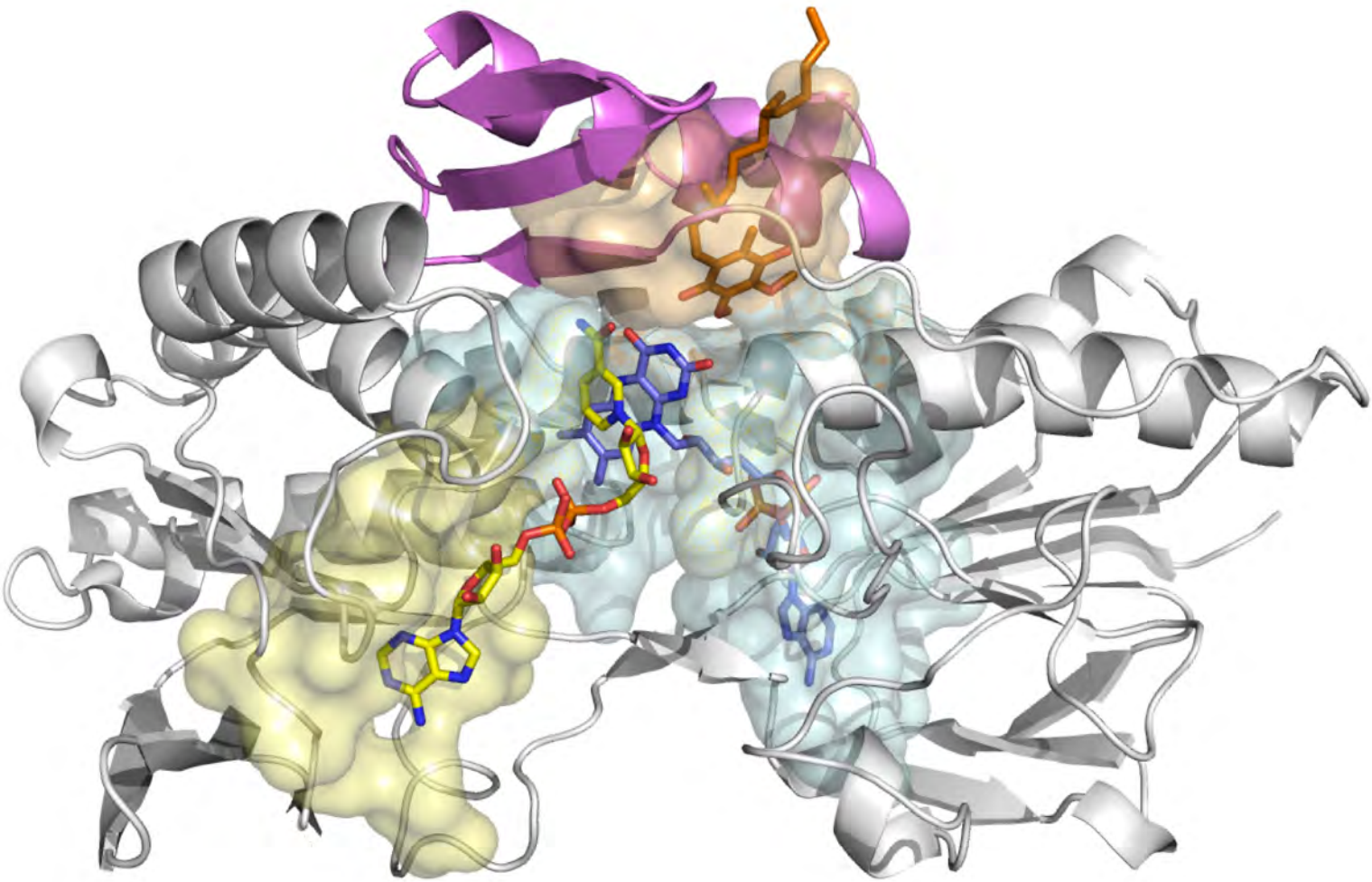
Bill is the co-Director of the Auckland Cancer Society Research Centre (ACSRC) at the University of Auckland, which has bought 14 new anti-cancer drugs through to clinical trial. This makes it one of the most productive academic institutes in the world. Bill attributes its success rate to the ACSRC's multi-disciplinary approach, which has allowed him and his team to follow the development of drug therapies from concept through to execution. "Academic institutions are largely mono disciplined, but ours is very multidisciplinary."

He attributes winning the award to "being in the privileged position of working with a lot of bright people". It probably helped that he was known in chemistry circles in the USA – Bill has long recognised that getting drugs to trial requires working with commercial organisations, and the ACSRC has collaborated with a number of international pharmaceutical companies and the biotech industry. This includes companies such as Pathway Therapeutics and Proacta (Inc), of which Bill was a co-founder.

Maurice Wilkins Centre Director Professor Rod Dunbar says winning the award is an extraordinary achievement for a scientist outside the United States. "And it emphasises how fortunate we are to have him here. Bill is an international icon in drug discovery, an inspiration to all our scientists who strive to achieve at the highest international level from a New Zealand base."

Much of drug development, such as up-scaling production and regulatory processes and clinical trials, takes place outside the lab. However Bill's team has shown that much can be achieved in the earlier stages, in academic institutions and through academic collaborations. The MWC has been instrumental in developing academic collaborations within New Zealand, says Bill. This includes a collaboration between the MWC and researchers at Victoria University, Wellington, which is investigating ways of using microbes to synergise with chemotherapy treatments to fight cancer. "That has been a particularly productive collaboration."

In November, Bill hopped on a bike for the first time since he was a student, for the inaugural Ride to Conquer Cancer organised to raise money for the Cancer Society Auckland. As one of the ACSRC's cycling team, the Drug Runners, he was required to ride a 200 km cycling journey over two days. He describes the event as "very hard", particularly the "hilly bits". "I only got a bike in September, so I had to train hard". However, the event raised $2.1 million, which will assist Cancer Society Auckland in its continuing support of the MWC's life-saving research.



Representation of the 3D structure of the type II NADH dehydrogenase (NDH-2) from Caldalkalibacillus thermarum as featured on the front cover of Molecular Microbiology. The NDH-2 protomer (in grey ribbon) viewed from the side displaying the binding regions of FAD, (putative) aqueous NADH (yellow) and lipophilic quinone (orange). The membrane-anchoring region is highlighted in magenta. For further details see Heikal et al. (2014), Molecular Microbiology, 91: 950–964.
Image courtesy of Dr Adam Heikal.

Stepping up the fight: The Tuberculosis Flagship

The Maurice Wilkins Centre is behind the launch of a national research network of 'serious intellectual muscle' that aims to speed up action against tuberculosis.

Tuberculosis kills more than 1 million people, and 10 million new cases are diagnosed every year; the disease is becoming increasingly resistant to drugs. In New Zealand, TB incidence is low, but has risen by 10% since 2007, with most new cases coming in from overseas.

In a bid to leverage the best scientific minds in the TB-eradication business, MWC has supported the creation of the Tuberculosis Flagship, a national network of TB researchers.

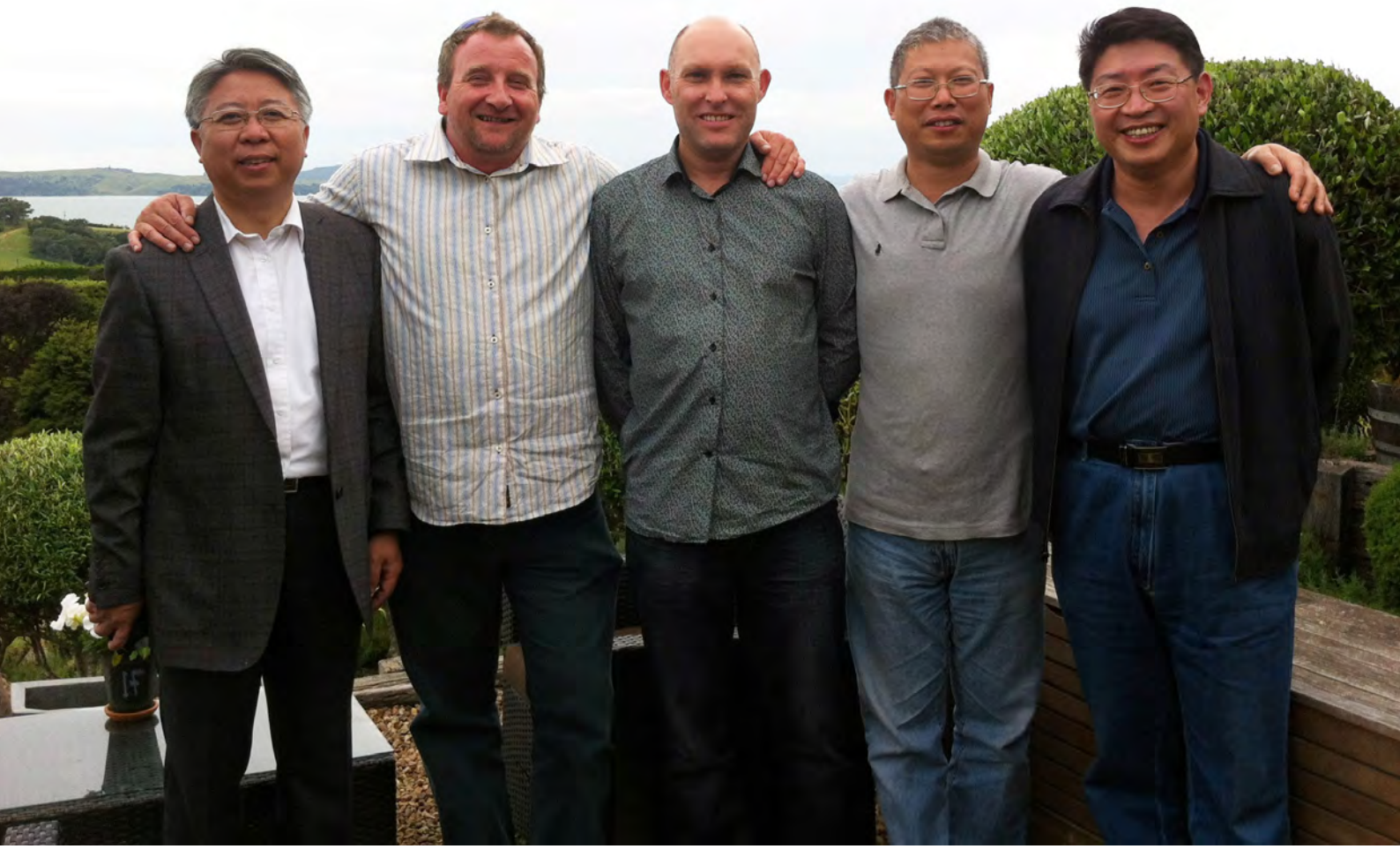
It's led by MWC investigators Professor Greg Cook, a bacterial physiologist at the University of Otago, and structural biologist Shaun Lott of the University of Auckland. It comprises 14 other MWC investigators, whom Greg characterises as "some serious intellectual muscle" from Otago, Canterbury, Victoria, Waikato and Auckland universities.

Greg says the impetus to set up the TB Flagship came from the realisation that researchers working in isolation on different drug targets would struggle to deliver the funding, research and resource efficiencies to speed up action against Mycobacterium tuberculosis, which causes human TB.

So in early 2013, the MWC funded a meeting of 20 of New Zealand's top TB researchers, at which Greg and Shaun put the case for doing things differently. The response was overwhelmingly positive, and the decision was made to focus on a small number of promising new drug targets for TB. One of them, type II NADH dehydrogenase (NDH-2) a membrane protein involved in energy generation, is a member of a new class of targets that has shown the greatest promise in reducing the treatment of TB from nine months to a game-changing eight weeks.

The first drug developed against energy generation of Mycobacterium tuberculosis was Bedaquiline; when licensed in 2012, it was the first novel anti-tuberculosis drug given the green light in 40 years. Working together, two of the groups in the TB Flagship have revealed the high-resolution structure of NDH-2, establishing a framework for the structure-based design of small-molecule inhibitors against this essential TB enzyme. The TB Flagship will provide the expertise to find inhibitors against NDH-2, and is in a good position to claim international funding to advance these inhibitors into the pre-clinical pipeline.

Greg says the TB Flagship recognises the threat posed by multidrug-resistant (MDR) TB cases and extensively drug-resistant (XDR)-TB; 84 countries have reported the latter, including New Zealand. The TB Flagship is also part of the international research effort to develop new molecular diagnostics, and this includes training researchers from under-resourced countries. This year, a doctoral student from Myanmar is spending 10 weeks in Greg's lab to learn about molecular techniques to study drug-resistant TB.



Collaborators meeting in New Zealand. From left, Dr Lu, Associate Professor Adam Patterson, Dr Jeff Smaill, Professor Ke Ding, and Professor Donghai Wu.
Image courtesy of Dr Jeff Smaill.

New strategic alliance with China

Maurice Wilkins Centre investigators lead two research grants awarded in 2013 under the New Zealand-China Strategic Research Alliance (SRA).

The SRA is aimed at facilitating science research collaboration and the commercialisation of science between China and New Zealand. Both collaborations will look at developing drugs to treat cancer and have resulted from the MWC's programme to build strategic relationships with Chinese scientists and research institutions. This programme has involved six bilateral exchanges by groups of scientists and included a visit to the centre in 2012 by Madam Liu Yandong, Vice-Premier of the People's Republic of China.

MWC deputy director Professor Peter Shepherd, who has led the development of relationships with China says: "This is a wonderful opportunity to build meaningful long term collaborative science links with China, that combines New Zealand know-how in cancer drug discovery with China's awesome technical capabilities. The research has significant potential to deliver health and economic benefits to both countries."

MWC investigators have extensive experience in drug development, having been involved in bringing 15 anti-cancer compounds to trial – "more than a lot of pharmaceutical companies have done in the same period of time," Peter says. China is set to become a scientific powerhouse, having invested heavily in scientific research, and offers access to resources beyond the financial reach of New Zealand institutes. "Take high throughput screening for example.The National Centre for Drug Screening has 1.5 million compounds and all the robots you need. We bring exciting new projects. It's win-win for both parties."

One project, headed by MWC investigators Dr Jeff Smaill and Associate Professor Adam Patterson, both from the University of Auckland, involves work with Professor Ke Ding at the Guangzhou Institutes of Biomedicine and Health and the Chinese Academy of Sciences. It will look at developing new drugs to target smoking-related lung cancer. Another, led by Peter, involves fellow University of Auckland researchers Dr Annette Lasham, Professor Bill Denny and Associate Professor Cris Print, along with Professor Antony Braithwaite from the University of Otago. They will collaborate with Professor Ming-Wei Wang at the NCDS at the Shanghai Institute of Materia Medica, Chinese Academy of Sciences, to develop new anti-cancer drugs against three new genetically defined targets.

The SRA is jointly funded by the New Zealand Ministry for Business, Innovation and Employment, and the Chinese Ministry of Science and Technology. The two new projects comprise an area of the SRA focused on non-communicable diseases.

The selection process results were announced in November, in New Zealand by the Minister of Science and Innovation, Steven Joyce, and by his Chinese counterpart, Professor Wan Gang, Minister of Science and Technology. "China is a key strategic partner for New Zealand in science and innovation and the SRA helps strengthen this partnership on both sides," Mr Joyce says. "By combining each other's strengths and expertise, our researchers can produce outcomes which will benefit our countries."

World experts in group A streptococcus attended the MWC hosted symposium to advance development of a vaccine.
Image by Lydia Arnold

Advancing a vaccine for rheumatic fever

In 2013 the Maurice Wilkins Centre hosted a symposium attended by world experts in rheumatic fever. It marked the start of a trans-Tasman collaboration to eliminate the disease by developing an effective vaccine.

Rheumatic fever is a childhood disease that can damage the heart, causing rheumatic heart disease. Every year around 200 New Zealanders get rheumatic fever; mostly Maori and Pacific Island children, who suffer the disease at some of the highest rates seen elsewhere in the world.

The symposium was organised after Prime Ministers of both New Zealand and Australia agreed to contribute equal shares of funding towards identifying a vaccine. Among the attendees were the developers of three leading vaccine candidates. The two-day gathering allowed research experts to review data on each of the vaccines and explore whether they would be suitable for target populations in Australia and New Zealand.

Rheumatic fever is caused by infection with the bacterium Group A Streptococcus, or GAS. MWC principal investigator, Professor John Fraser, an expert in the biology of this organism, says the symposium was attended by the "who's who of GAS researchers". This reflected the global connectedness and international credibility of the MWC.

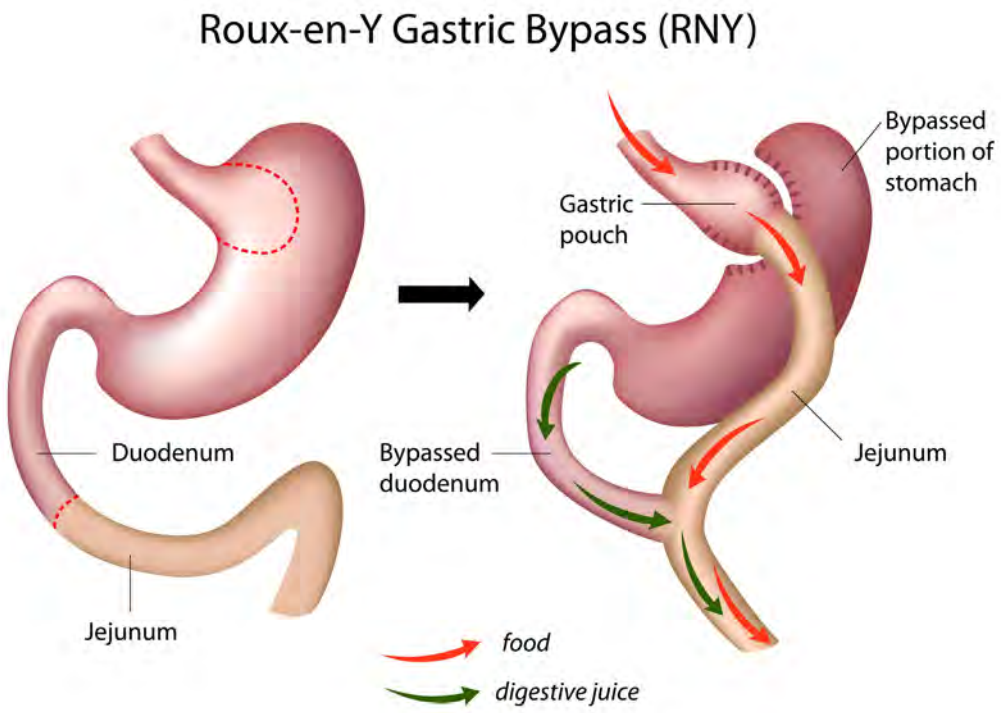
The symposium focused "on whether a vaccine would work, and what the outstanding issues are to advance these vaccines into clinical trials. We need to develop a strategy to rapidly investigate, whether one, two or all three of the vaccines meet our criteria."

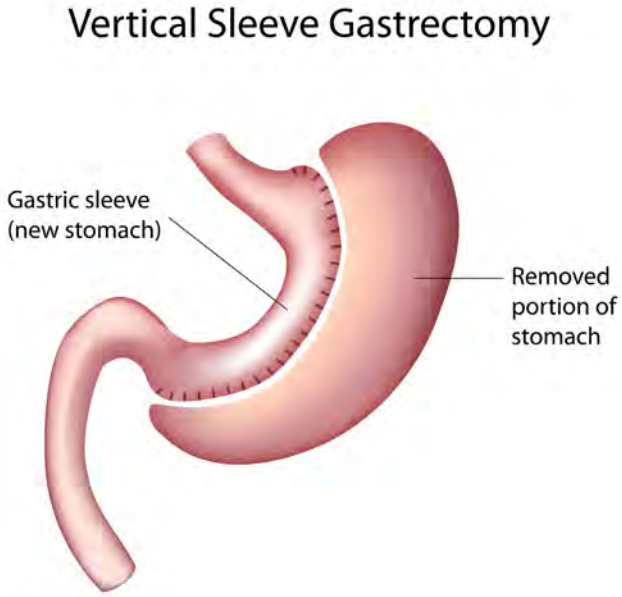
Rheumatic fever is a key research focus at the MWC which is also funding research to understand how GAS infections cause rheumatic fever. Dr Nikki Moreland, also supported by a Heart Foundation fellowship, is studying the immune "fingerprint" of the disease. It is thought that antibodies directed at the GAS bacteria cross-react with the heart and cause rheumatic fever, but the nature of these antibodies, and exactly what they attack in the heart, is still unknown.

Other MWC researchers are investigating the biology of GAS bacteria. Studies led by clinical microbiologist Dr Deborah Williamson and researcher Associate Professor Thomas Proft, are defining key characteristics of the strains of GAS found in New Zealand.

"This information is really important for the vaccine efforts," says Nikki. "The vaccines under consideration have been developed based on what strains are circulating in the USA and Europe, so we need to understand what strains are here. It's quite a dynamic bacterium, and strains vary in different geographical locations and at different points in time."

Through this combined approach – increasing fundamental knowledge of rheumatic fever, while also accelerating the progress of the most promising existing vaccine designs – the MWC aims to develop long-term solutions to one of New Zealand's most damaging infectious diseases





Schematic diagrams of two different types of bariatric surgery: the Roux-En-Y gastric bypass and (below) the sleeve gastrectomy.

A fresh approach to diabetes

Type 2 diabetes is often caused by obesity, and weight-loss surgery usually reverses it. However, we don't know precisely how this happens, and a new study at the MWC aims to find out.

Obese people are at high risk of developing type 2 diabetes, which has downstream complications such as heart disease, stroke and kidney failure. So it was a revelation when bariatric surgery, originally a largely cosmetic procedure to achieve weight loss, was found to rapidly eliminate diabetes – often before any significant weight loss had occurred. And even more astonishingly, says MWC Deputy Director Peter Shepherd, the surgery dramatically reduces the risk that non-diabetics develop the condition.

"That's really compelling," Peter says. It appears that bariatric surgery somehow alters the hormones that control appetite, satiety and aspects of glucose metabolism, some of which may be through changing gut bacteria.

A MWC-funded study is underway to scrutinise the characteristics of gut hormones and bacteria in patients before and after two different types of bariatric surgery. The first is the Roux-En-Y gastric bypass, where the stomach is stapled down to the size of an egg then connected directly to the lower part of the small intestine, bypassing the rest of the stomach and the first part of the small intestine. The second is the sleeve gastrectomy, where the stomach pouch is made into a drastically smaller tube.

Leading the blinded randomised trial is MWC investigator Dr Rinki Murphy, an endocrinologist and senior lecturer in the Department of Medicine at the University of Auckland, working with Auckland bariatric surgeon Mr Michael Booth.

Pre-surgery, Rinki says, participants keep a food diary, complete an appetite assessment, and various measurements are made and samples taken to provide baseline data. These will be repeated at one and five years after the surgery; so far, 15 patients have just passed the one-year mark.

The hypothesis, she says, is that the Roux-En-Y, while technically more difficult surgery, leads to the most favourable hormonal changes in terms of diabetes and weight-loss "because the hormones released in relation to the same food consumed promote greater satiety". Gut bacteria might be an untapped resource, too, she says – some microbiota may be more wasteful, or less efficient, at extracting energy from food after a Roux-En-Y compared to a sleeve gastrectomy.

The goal, she says, "is that we might be able to encourage the growth of wasteful bacteria and find novel treatments that promote the feeling of being full without having to go through surgery. Avoiding surgery is the ultimate aim, but we're taking steps to find out what's happening with these bacteria and hormones."

Honours student Tom Wright.
Image courtesy of Pauline Curtis

New chemistry transforms cancer vaccine

A new kind of chemistry that dramatically simplifies the manufacture of cancer vaccines was created this year by Honours student Tom Wright.

In 2013, immune therapy for cancer was a very hot topic in cancer medicine. The first clinical trials showing immune therapy could benefit large numbers of patients have led to predictions that immune therapy will eventually become routine for cancer patients.

As part of its immune therapy programme, the MWC, with support from the Health Research Council, has been developing new vaccines for cancer patients that aim to stimulate the immune system to attack cancer cells. These vaccine molecules are made in a modular system. Molecules that stimulate the immune system are "clicked" together with molecules that mimic those found in cancer cells. When these combined molecules are injected they stimulate immune cells to seek out and destroy cancer cells bearing the molecule that was in the vaccine.

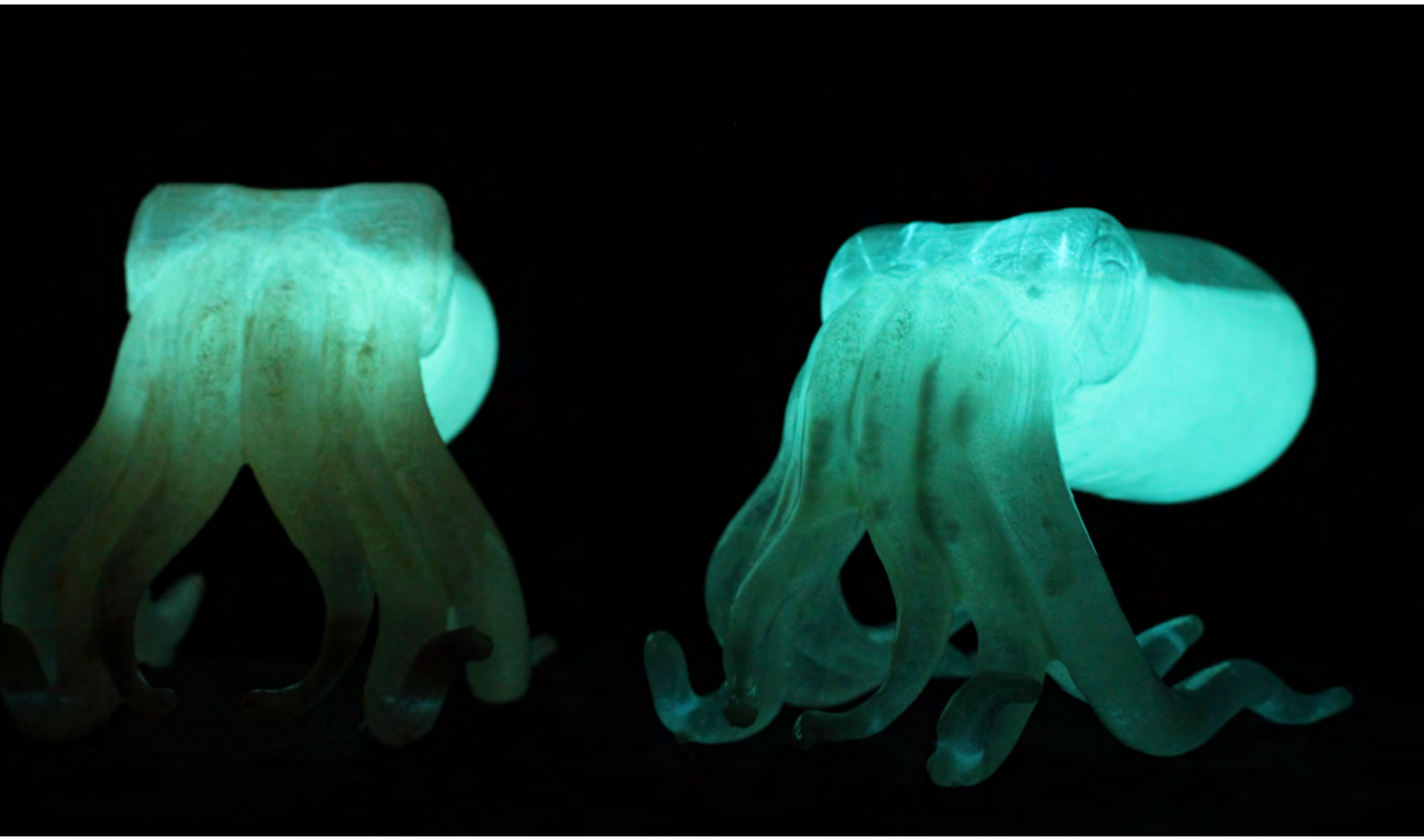
MWC investigator Professor Margaret Brimble supervised Tom Wright's research project in the School of Chemical Sciences at the University of Auckland. "In this project we were thinking about translation of our work to patients up front – molecules we'd be able to manufacture ourselves for use in clinical trials," she says. "Tom developed a simple and elegant new method for joining the immune stimulant with the cancer molecule. And the very simplicity of the method makes it much easier to manufacture the molecules safely for clinical trials. Tom came up with a very clever solution to the challenge."

The work may soon be used in the clinic, as the University of Auckland's peptide chemistry laboratory now has a dedicated facility to manufacture cancer vaccines at a standard suitable for clinical trials. "We're now looking at different molecules to target in different cancers, and also at improving the technology for further gains, in both effectiveness and ease of manufacture," Margaret says .

The initial work has already been published in *Angewandte Chemie*, one of the most prestigious journals in the field of chemistry. It has also led to the filing of a patent that will enable the technology to be taken to clinical trials.

Biological testing of the new molecules took place in the laboratory of MWC Director Professor Rod Dunbar. MWC Research Fellow Dr Anna Brooks developed new methods to test the compounds using human blood samples, which provided an immediate indication of the human immune response to these molecules. Tom worked with Anna and Dr Julie Macintosh to carry out many of the biological tests, learning practical biology as part of an inter-disciplinary project.

Tom is now in Oxford after winning a highly competitive Rutherford Foundation scholarship to fund his doctoral studies in chemistry. After such an outstanding start to his career, the MWC is understandably very keen to attract him back, following what will undoubtedly be a highly successful sojourn in the UK.



3D printed squid filled with billions of Vibrio fisheri, a bioluminescent bacteria usually found in the sea were part of the installation “Living Light” at Art in the Dark.
Image courtesy of Dr Siouxsie Wiles

Spreading the word

This year Maurice Wilkins Centre investigator Dr Siouxsie Wiles not only won the Callaghan Medal for science communication, awarded by the Royal Society of New Zealand, but also the Prime Minister's Science Media Communication Prize and the New Zealand Association of Scientists Science Communicators Award in 2012.

Siouxsie is a microbiologist at the University of Auckland who uses bioluminescence as a way to study the pathogens that cause infectious diseases, such as tuberculosis and hospital superbugs. In her free time she frequently provides scientific comment for the media, is a prolific blogger, was a face of the public engagement campaign for the National Science Challenges, regularly gives public science talks and appears in a fortnightly science slot on *Radio New Zealand's Nine to Noon*.

She has also written and produced innovative animations, where she highlights how bioluminescence – the ability of living organisms to produce light – is being used in science and technology in contemporary ways.

She uses the animations to captivate people's attention when giving public lectures and has also made these animations publicly available on YouTube. "They haven't quite gone viral, but they've had over 6000 views each, and I know that people are using them in their undergraduate teaching around the world."

As well as helping fund some of Siouxsie's infectious disease research and the animations, MWC also supported her collaboration with artist Rebecca Klee, and their installation for Art in the Dark in 2013 in Auckland. The installation, called "Living Light", involved 12 plastic squid produced by a 3D printer, each filled with billions of Vibrio fisheri, a bioluminescent bacteria usually found in the sea. It attracted long queues on both nights. "It made the invisible visible and brought science and nature into the artistic realm."

The Prime Minister's Science Communication award was worth $100,000, with $50,000 allocated to science communication. Siouxsie's plans include writing a children's book on bioluminescence, producing an animation about the anglerfish, made famous by the movie *Finding Nemo*, and creating a website, GlowHub, where she will showcase her films and also a series of short documentaries on the work of cutting-edge Kiwi scientists.

"People often think scientists are aloof and science is irrelevant or boring. I strongly believe scientists have a responsibility to dispel these myths, which only serve to perpetuate the idea of us all living in ivory towers, disconnected from the real world. As a publicly funded researcher I also think the public have a right to know how I'm spending their tax dollars!"

However, science still takes priority over science communication, she says, and nothing beats the thrill of a successful experiment. "But I'm very privileged to be able to investigate these cool things, and also to find ways of talking about them in innovative ways.

Dr Vaughan Feisst (left), Professor Rod Dunbar and Dr Anna Brooks
Image by Dean Carruthers for the University of Auckland

Partnerships boost business: MWC supports Auckland Clinical Studies

The Maurice Wilkins Centre provides world-class support for medical trials provider Auckland Clinical Studies, helping to cement New Zealand's growing reputation as a good place to do science business.

Auckland Clinical Studies (ACS) performs phase I and II clinical trials in New Zealand – those involving human volunteers – and does most of them for international pharmaceutical companies.

In 2012, the company told a conference it was having difficulty finding collaborating scientists to provide innovative laboratory tests for trials. One of those listening was MWC Director Professor Rod Dunbar. ACS Operations Director Dr Christian Schwabe takes up the story: "Rod approached us and said that that's exactly what he would like to provide."

The timing was perfect. ACS had two pharmaceutical companies that wanted to conduct healthy-volunteer studies in New Zealand. The studies required flow cytometry, a laser-based technique for examining cells. Step forward Dr Anna Brooks, the MWC Research Fellow who runs the MWC's flow cytometry facility, and her colleague in Rod's lab, cell biologist Dr Vaughan Feisst.

Academic research environments are reflexive and adaptive, but contract research demands sticking rigorously to pre-defined protocols and standards and regularly quality-checking the performance of both machinery and personnel. Rod and his team rearranged their laboratory in order to support this approach. "There was a willingness to invest the time to set up the assays and to do the validation work," Christian says. "Their interest was in getting the data right, to deliver the quality, and everything else was secondary. "

The scientists also came up with solutions when tweaks to lab protocols were required, and adjusted their own research programmes to respond to the trials' very precise timetables. A protocol may require, for instance, that blood samples are taken at a particular time and processed immediately. The MWC made sure this timetable was met.

"What [the MWC] presented was very much a can-do attitude and a willingness to respond to the sponsors' needs," says Christian. "The companies we work with could choose to do their studies anywhere in the world; at the end of the day we provide a service to them, and we need to have the mentality that goes with that."

Both pharmaceutical companies were "extremely positive about the collaboration with Rod and his team… their communication was great," Christian adds. "I need to be confident that the lab knows what they are doing, and I am very confident with Rod and his team."

To date MWC's laboratory support has helped ACS to secure contracts worth around $2 million, he says. "In this business it's a lot about trust and relationships. It's word of mouth, more than anything, that gets us work." To learn more about Auckland Clinical Studies, visit: www.clinicalstudies.co.nz

High school biology teachers, including MWC teacher fellowship winners, attending Queenstown Research Week together with Hon Steven Joyce and Nobel laureate Susumu Tonegawa
Rana El Farra (Tarawera College), Jan Galland (Napier Girls High School), Sarah Johns (Nelson College), Hon Steven Joyce, Prof Sususmu Tonegawa, Prof Peter Shepherd, Rachel Heeney (Epsom Girls Grammar), Helen Webber (Epsom Girls Grammar), Helen Swift (Epsom Girls Grammar)
Image courtesy of Prof Peter Shepherd

Teacher development, from Kaitaia to Invercargill

This year the Maurice Wilkins Centre expanded its programme of professional development days for science teachers.

The free one-day events have been designed to support teachers in their teaching of new units in the NCEA Level 3 Biology curriculum. The initiative was developed by head of biology at Epsom Girls Grammar School, Ms Rachel Heeney, and MWC Deputy Director, Professor Peter Shepherd.

"I believe that you get results by empowering people, and you need to empower people through the teachers," Peter says.

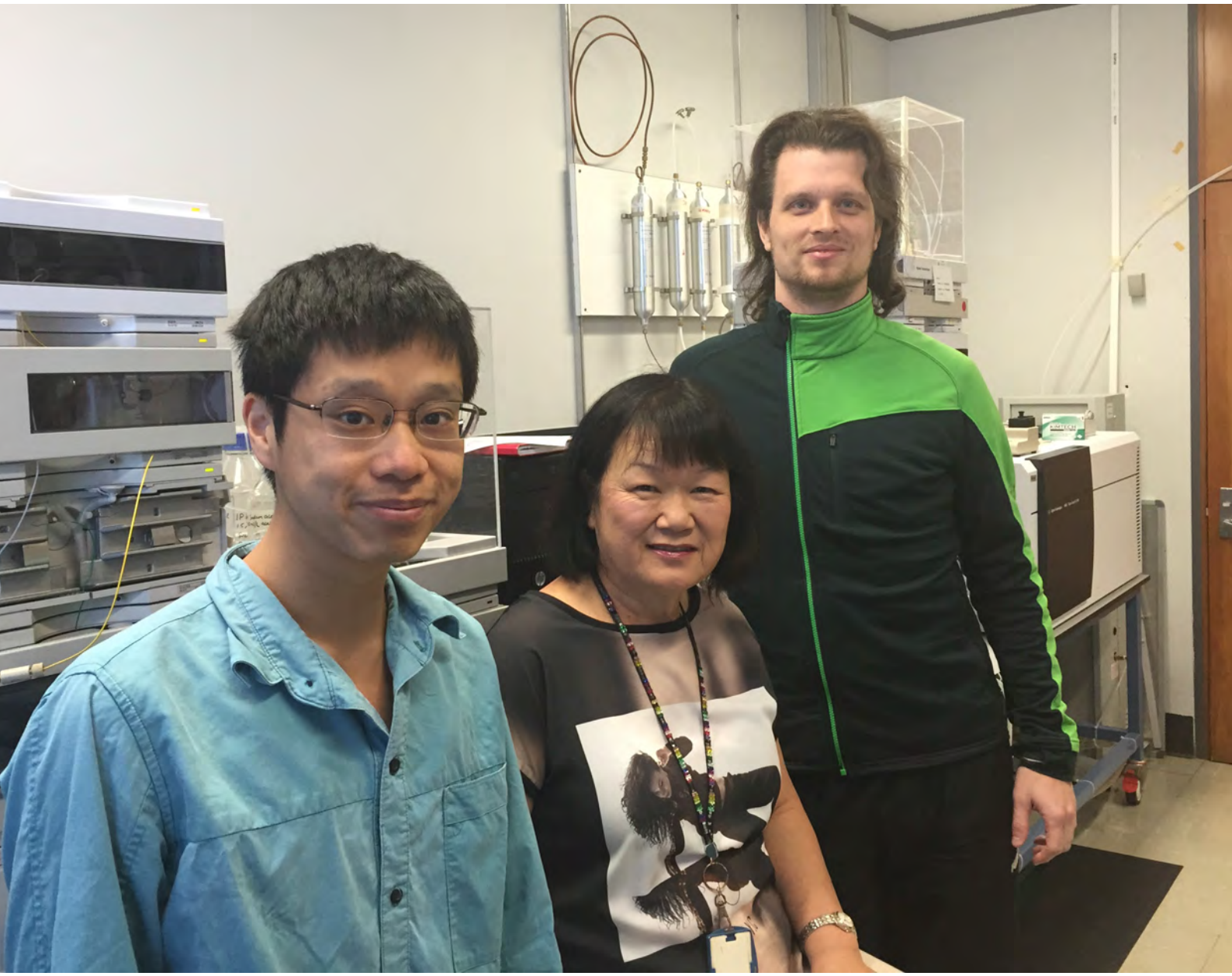
After the success of the inaugural event in Auckland in 2012, the programme was expanded in 2013 to include Kaitaia, Rotorua, Napier, Wellington, Nelson, Christchurch, Dunedin and Invercargill. "And I was flooded by emails after these events occurred," says Rachel. Teachers said they had come away from the event, feeling more informed and knowledgeable. "We didn't want to be taught how to teach, but to have the chance to learn more about biology, and that's what the MWC has given us." At each event teachers heard from scientists from New Zealand universities as well as those working in Crown Research Institutes, and on a variety of topics.

In Kaitaia, for instance, Peter focused on homeostasis, a new unit in NCEA Level 3, specifically in relation to metabolism and diabetes. The understanding of the disease has changed radically since many biology teachers were at university, he says. "And it is a way that teachers could bring in a disease that affects their community, and through that help communities develop a better understanding of that disease. It's more interesting to the students too, because they can relate to it."

Other topics discussed by scientists included the manipulation of plant genomes, human genomics, and human stem cells, all topics where the science is rapidly changing, making it difficult for science teachers to keep up. The scientists provided teachers with classroom-ready material, ideas and discussion points on the day and via the MWC website.

"It gave us the opportunity to spend time with highly qualified scientists, who gave us tips on how we could teach a topic and make it clear", says Jan Galland, a biology teacher at Napier Girls High. Jan was also awarded a MWC biology teacher development scholarship, a complementary initiative also aimed at linking science teachers with scientists. This allowed her to attend the Queenstown Molecular Biology Conference in 2013, which was not only personally educational, but highlighted the myriad opportunities now open to science graduates. "Going down there and meeting all these people who were doing their PhDs, and the range of topics, really motivated me to encourage students, to get a good BSc, to do their Honours and get on with their studies."

Based on an overwhelmingly positive response, the Centre will continue to expand the programme in the future.



Simon Fung, Associate Professor Lai-Ming Ching and Petr Tomek.
Image courtesy of Yuli Quay

New therapies – from a new generation

Nurturing the next generation of scientists is an important part of the Maurice Wilkins Centre's work – and senior students contribute an enormous amount to research success.

"Students are young, energetic, and enthusiastic and can bring new ideas and a fresh approach to solving difficult problems," says Associate Professor Lai-Ming Ching, a MWC associate investigator and member of the Auckland Cancer Society Research Centre at the University of Auckland.

Take PhD students and MWC affiliate investigators Simon Fung and Petr Tomek, who are working on an immunotherapy project headed by Lai-Ming. They are looking at a protein called IDO1 (indoleamine 2,3-dioxygenase 1), which cancer cells use to impair the function of the immune system's killer cells. The aim is to develop a drug to block the protein's action and give the immune system's cancer killers a fighting chance.

Simon identified how various compounds interacted with the IDO1 protein to find out which ones were most likely to limit its activity. Already, he has two papers published in peer-reviewed international journals.

Petr developed a new biochemical assay for measuring IDO1 activity that is more sensitive and easier to use than those previously published, and is establishing an assay that will measure the activity of a related protein, TDO (tryptophan oxygenase). He also has two papers published.

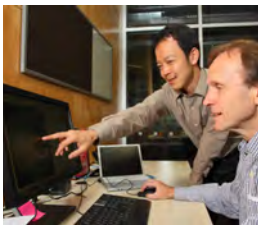
Lai-Ming, a tumour biologist, is delighted with the pair's significant contribution. "Drug development requires a multi-disciplinary team approach, engaging researchers from different disciplines in a common goal," she says. "Involving Simon and Petr exposes them to the team approach, and allows them an opportunity to work with investigators from a broad range of disciplines – from synthetic chemistry to in-vivo pharmacology and toxicology."

Simon, who has a BSc with first-class honours from the University of Auckland, was keen to explore two of his favourite subjects, immunology and cancer, in his doctoral studies; his work on the IDO1 project has been jointly funded by the MWC and the Auckland Medical Research Foundation.

Petr, who did graduate and post-graduate studies at University of South Bohemia in his native Czech Republic, was attracted to the MWC after reading the list of PhD projects listed on Lai-Ming's website. "I am strongly convinced that harnessing the power of our immune system is the most sensible and powerful approach in the battle against cancer."

Both Simon and Petr are keen to pursue post-doctoral careers in biomedical research – where they will, in turn, help to raise the next generation of cancer fighters.






Outreach

International engagement

The Maurice Wilkins Centre is actively building international links for New Zealand biomedical science. As a national Centre of Research Excellence it is in a unique position to represent New Zealand on the global stage, providing a crucial connection between local and international researchers. In addition to investigators' links with scientists, laboratories and companies overseas (see pages 66 and 69), the Centre is building strategic relationships with entire institutions, provinces, and countries, in particular in the Asia-Pacific region

China

Engagement with China was a major focus for the Centre in 2012 and many of the institutional and collaborative relationships established then have continued to strengthen in 2013 due to the Centre's ongoing programme.

- In March, a session of the Queenstown Molecular Biology Meeting was held in Shanghai alongside the 5th National Forum on New Technologies in Drug Discovery. The meeting was jointly chaired by Maurice Wilkins Centre Deputy Director Professor Peter Shepherd and Professor Ming-Wei Wang, Director of the National Centre for Drug Screening at the Shanghai Institute of Materia Medica. Over 300 delegates attended the meeting from many parts of China and the programme featured 25 speakers from the USA, UK, New Zealand, Korea and China. In addition to Professor Shepherd, the Centre enabled four of its investigators to attend the meeting to speak about their research, Associate Professor Adam Patterson, Associate Professor Debbie Hay, Dr Jeff Smaill and Dr Jack Flanagan.
- In November it was announced that Maurice Wilkins Centre investigators and their collaborators in China were awarded two of the four joint research projects funded by the New Zealand-China Strategic Research Alliance. These projects arose directly from the Centre's programme developed in 2012 and 2013 to link researchers from New Zealand with high level research institutes in China (see story on page 11).

- One of these SRA projects is a collaboration between Centre investigators Dr Jeff Smaill and Associate Professor Adam Patterson (University of Auckland) and Professor Ke Ding at the Guangzhou Institutes of Biomedicine and Health and the Chinese Academy of Sciences. In December Professor Ding and his colleague Professor Donghai Wu visited Auckland and during their visit the Centre invited representatives of MBIE, HRC and the Chinese Ministry of Science and Technology to a briefing meeting with the New Zealand and Chinese scientists to discuss the project focus and direction.
- In November Professor Peter Shepherd was appointed Honorary Professor at Zhejiang University in Hangzhou, currently ranked number one university in China.
- In December the Centre hosted a delegation of seven Biopharma officials from Beijing led by Mr Zhou Xiaobai, Vice Director-General of the Beijing Scientific and Technical Cooperation Centre. The purpose of the visit was to investigate opportunities for cooperation in drug innovation, high-end talent introduction and technology transfer between the Beijing organisations and the Centre. A full list of delegation members is provided on page 50 of this report.
- A delegation from the Jiangxi Province of China, led by Mrs Xueqin Guo, Director General of the Department of Science and Technology of Jiangxi Province, also visited the Centre in December 2013 to investigate collaborative opportunities. A full list of delegation members is provided on page 50 of this report.

Japan

2nd New Zealand-Japan Joint Immunology Workshop

The Maurice Wilkins Centre hosted distinguished scientists from Japan at the second New Zealand-Japan Joint Immunology Workshop, held at the University of Auckland's Fale Pasifika on the 26th and 27th March 2013. The event brought together leading immunologists from the two countries, to discuss their latest work ranging from allergy vaccines to immune therapy for cancer and new technology for studying the immune system.

"Immunology in Japan is very high performing – it's one of the best countries in the world in the field. So it's a great privilege to hear from our Japanese colleagues," said Director Professor Rod Dunbar who encouraged the scientists to use the workshop to identify potential collaborative opportunities.

Professor Takeshi Tokuhisa, Vice President of Chiba University, said that this was the Japanese scientists' first visit to New Zealand and they had formed a very favourable impression. "I really want to continue this collaboration, and for it to become stronger and stronger," he said, noting that in a small country scientists could gather together quickly and easily, facilitating collaboration.

This was the second meeting between Maurice Wilkins Centre scientists from around New Zealand and colleagues from RIKEN Research Centre for Allergy & Immunology (RCAI) and Chiba University. The first took place in 2010, with visit by Maurice Wilkins Centre scientists to Japan sponsored by the then Ministry of Science and Innovation (now the Ministry of Business, Innovation and Enterprise (MBIE)).

The latest workshop is part of a MBIE supported collaborative programme of joint scientific meetings and individual exchanges that began in 2011, as a result of formal relationships being established with all three of the Japanese institutions the New Zealand scientists visited; RIKEN RCAI, Chiba University, and the Osaka University Immunology Frontier Research Centre (iFReC).

See page 50 for a full list of speakers at the meeting.

4.1.3 Asian Chemical Biology Initiative

In January 2013 Maurice Wilkins Centre investigators Professor Margaret Brimble and Professor Peter Shepherd represented the Centre and New Zealand at the second annual meeting of the Asian Chemical Biology Initiative (ACBI) held in Bangkok, Thailand. The ACBI meeting provides a great opportunity for the Maurice Wilkins Centre to build new collaborative relationships with scientists from the Asian region including Japan, Korea, China, and Singapore.

The ACBI aims to accelerate Asian chemical biology by fostering international collaborations and sharing resources and to promote the field in emerging Asian countries by recruiting and training their brightest graduate students. For more information about the ACBI see http://www.asianchembio.jp/

Industry engagement

The Maurice Wilkins Centre supports innovation in the biotechnology and drug development sector by providing companies with the expertise and facilities that their research and development programmes require. Centre investigators also provide consultancy to industry as described on page 69.

In 2013 the Centre provided expertise and/or facilities to:

- **AstraZeneca.** This global biopharmaceutical company has a primary focus on the discovery, development and commercialisation of prescription medicines. Professor Margaret Brimble and PhD student Anais Noisier successfully filed a patent with AstraZeneca that covers a novel method for the manufacture of high value unnatural amino acids. Professor Brimble is now working with Auckland UniServices Ltd to identify suitable companies that can translate this research into the high value manufacturing market.
- **Auckland Clinical Studies Ltd.** This company provides Phase I and II clinical research to local and international pharmaceutical and biotechnology companies. In 2013 Maurice Wilkins Centre investigators Professor Rod Dunbar, Dr Anna Brooks and Dr Vaughan Feisst continued to work with Auckland Clinical Studies, providing analytical services to support ongoing clinical trials sponsored by two major pharmaceutical companies (see page 13).
- **Bayer New Zealand Ltd.** This company is part of the global Bayer Group that has major businesses in health care, nutrition and high-tech materials. Maurice Wilkins Centre investigator Professor Margaret Brimble has continued to work with Bayer New Zealand's Healthcare sub-group on new drugs for use in livestock. In addition Maurice Wilkins Centre investigator Dr Vinod Suresh is providing expertise to the company on modelling rumen metabolism.
- **Connovation Ltd.** This company is based in Auckland and undertakes research, development and manufacture of invasive animal pest control technologies. The company aims to develop smarter pest control products which are humane, cost effective and more specifically targeted to pest species. Maurice Wilkins Centre investigator Professor Margaret Brimble is working with the company on designing and synthesizing new molecules as humane rodenticides to replace the toxin 1080.
- **Innate Immunotherapeutics Limited.** This biotechnology company, founded in Auckland but now with offices in Australia and NZ, has designed and manufactured a unique immunomodulator microparticle technology platform that has a wide range of potential health applications, with MIS416 being its lead therapeutic candidate. Maurice Wilkins Centre investigator Professor Michael Eccles and PhD student Francesco Mainini are working with the company to develop MIS416 derivatives for use in cancer immunotherapy.

- Janssen Therapeutics (division of Johnson & Johnson, USA, formerly Tibotech). Janssen Therapeutics is a pharmaceutical company with a focus on research and development for the treatment of infectious diseases. Maurice Wilkins Centre investigators Associate Professor Brian Palmer and Professor Bill Denny are collaborating with Janssen Therapeutics (in conjunction with the Global Alliance for TB) on the development of an improved, second-generation analogue of their TB drug bedaquiline, an ATP synthase inhibitor which was approved by the US Food and Drug Administration in late 2012.

- Landcare Research New Zealand Ltd. This Crown Research Institute provides solutions and advice for sustainable development and management of land-based natural resources. Maurice Wilkins Centre investigator Professor Margaret Brimble is working with Landcare Research to develop prodrugs of the rodenticide norbormide that have been patented and will be entering field trials in 2013.

- Pathway Therapeutics Inc (USA). This San Francisco-based company, with Maurice Wilkins Centre investigators Professors Bill Denny and Peter Shepherd as scientific co-founders, was established to discover and develop novel PI3-kinase inhibitors for the treatment of cancer. In late 2013 the company completed clinical trials of its lead compound PWT33597, on-sold it to another company, and closed operations.

- Proacta Inc (USA). This clinical-phase biopharmaceutical company, headquartered in San Diego, is developing hypoxia-activated prodrugs for the treatment of cancer. Maurice Wilkins Centre investigators Professors Bill Denny and Bill Wilson are two of the company's scientific founders and, along with investigators Dr Jeff Smaill and Associate Professor Adam Patterson, have been providing consultancy and contract research services. The investigators use mass spectrometry facilities and expertise established by the Maurice Wilkins Centre as part of their ongoing research into new compounds.

In addition to these examples above, Maurice Wilkins Centre investigators have established a variety of other relationships with companies and non-profit organisations that drive the translation of their research and expertise into new approaches to fight human disease (see page 55).

Science education

Supporting high-quality science education in New Zealand schools not only encourages the next generation of scientists but also helps others to understand and value science. In 2013 Maurice Wilkins Centre investigators were involved in many science education initiatives including;

- **Biology Teacher Professional Development days.** In 2013 the Centre supported 10 Biology Teacher Professional Development days, following an inaugural event in Auckland in 2012. Prof Peter Shepherd, Maurice Wilkins Centre Deputy Director, and Ms Rachel Heeney, Head of Biology at Epsom Girls Grammar School, organised events in Kaitaia, Whangarei, Auckland, Rotorua, Napier, Wellington, Nelson, Christchurch, Dunedin and Invercargill. These days were attended by over 500 teachers. Each day featured up to four leading scientists presenting on key topics relevant to the new NCEA Level 3 curriculum. See the highlights story on page 14 for more details of the programme.

- **Maurice Wilkins Centre biology teacher development scholarships**. The Centre continued to provide sponsorship for scholarships for high school biology teachers to attend the Queenstown Research Week in 2013. The aim of the scholarships is to give New Zealand teachers the opportunity to attend an international conference on contemporary biological research and to network with colleagues and practicing biologists from around the world. Recipients of the awards in 2013, the fourth year of this programme, were Erin Sycamore from Lytton High School, Gisborne, Rana El Fara from Tarawera High School, Sarah Johns from Nelson College for Girls and Jan Galland from Napier Girls High School.

- **Katoa New Zealand 'Hands on Metagenomics Day'.** The Maurice Wilkins Centre provided sponsorship to enable secondary school students from Kawerau, Rotorua and Whitianga to attend a unique hands-on science day at the University of Auckland, on the 28th September 2013. "It was a brilliant experience for the students – they got to do practical, hands-on things that I've only ever talked about or shown them videos of," says Rana El Farra, a teacher at Tarawera High School who, with the support of the Centre, brought eight high-achieving Year 11-13 students from this decile one school to the University. Students from around the country spent a day at either the University of Auckland, Massey University's Albany campus, the University of Canterbury or the University of Otago. They took part in a scientific experiment that aimed to describe how bacterial populations are changing over time in New Zealand soils, and in doing so improve their understanding of the environment in which we live. The event was run by Katoa New Zealand, a group of scientists, businesses, educators and community members who wish to inform and educate New Zealanders about our environment and the power of genomics.

- **Other science education initiatives.** Centre investigators continued to provide support in 2013 for programmes aimed at secondary school students including the LENScience 'Meet a scientist' sessions, the Rotary National Science and Technology Forum and the Biotechnology Learning Hub.

Public engagement

The Maurice Wilkins Centre actively engages with the public by sharing news of its research successes and by providing commentary on topical scientific issues. Centre investigators communicate with New Zealanders through the news media, public lectures and presentations, and through visits by school students. In 2013 Centre investigators generated national and regional media coverage on a variety of scientific topics. Examples include:

- News that a cell-based melanoma vaccine developed by Associate Professor Ian Hermans in collaboration with Dr Gavin Painter, Professor Rod Dunbar and Professor Margaret Brimble would begin clinical trials was featured on *TVNZ ONE News* and on the Fairfax Media website Stuff.co.nz. The role of Maurice Wilkins Centre investigators in the development of this vaccine was also highlighted during an interview with Professor Graham Le Gros on *Nine to Noon*, *Radio New Zealand*.

- Professor Rod Dunbar and Dr Vaughan Feisst were interviewed on *Campbell Live, TV3* about their research relating to the growth of synthetic skin for burns victims, funded through money raised by the Cure Kid's Red Nose Day appeal. Professor Dunbar also appeared in an interview about this work on the '*Comedy for CureKids' TV3* special on Red Nose Day, 23rd August 2013.

- Professor John Fraser was interviewed by *Newstalk ZB*, and *TVNZ ONE News* regarding a new trans-Tasman initiative to investigate potential vaccines for rheumatic fever.

- News that Dr Siouxsie Wiles was the recipient of the Prime Minister's Science Media Communication Prize was highlighted in a feature article in the *New Zealand Herald* in November (see page 12 for more details). In 2013 Siouxsie gave significant commentary on a variety of science-related news stories including the biology of the bacterium responsible for the Fonterra botulism scare as reported in the *New Zealand Herald* and the *National Business Review*; stories also featured on *TV3 News* (online) and the Fairfax Media website Stuff.co.nz. She was interviewed about the National Science Challenges on *Morning Report, Radio New Zealand*, and also collaborated with an artist creating an installation for Auckland Art in the Dark festival that later won the People's Choice Award at the Australian Science Communicators Conference. Dr Wiles is a correspondent for the *Nine to Noon* programme on *Radio New Zealand* in addition to writing a Science Blog and hosting a podcast.

- Professor Margaret Brimble, recipient of the 2012 Rutherford Medal, was highlighted in feature articles in *Verve Magazine* and *MiNDFOOD Magazine*. Margaret was also interviewed as a finalist for the inaugural Women of Influence awards; the interview was broadcast via YouTubeNZ, and other news stories relating to awards were reported on the Fairfax media website Stuff.co.nz. Margaret also presented "Mastering molecular chess to mine nature's medicine chest", as part of the Rutherford Lecture Series, at several locations around New Zealand.

- Professor Bill Denny was interviewed by the *Howick and Pakuranga Times* following his recent success, as the recipient of The American Chemical Society's 2014 Medicinal Chemistry Award; his participation in the "Ride to Conquer Cancer" and role at the Auckland Cancer Society Research Centre were also highlighted. This story was also featured on a number of websites.
- The award of the two New Zealand-China Strategic Research Alliance grants to Maurice Wilkins Centre investigators was reported in the *National Business Review* in November 2013 (see page 7 for a story on these grants)
- Professor Margaret Brimble, Professor John Fraser and Professor David Williams were profiled in the Royal Society of New Zealand's 2013 publication *Profiling Excellence* publication following their success at the 2012 Research Honours Celebrations.
- Associate Professor Cristin Print was interviewed by the *Sunday Star Times* and for the Fairfax Media website Stuff.co.nz on the role of genomics in medicine.
- Dr Julia Horsfield was interviewed on *TVNZ's Seven Sharp* programme about the potential for zebrafish to help understand human disease.
- Professor Peter Shepherd's research on a new mechanism for the regulation of insulin secretion was reported in the *New Zealand BioScience Magazine* and on the Health Research Council website.
- Maurice Wilkins Centre investigators also gave numerous public presentations about their research to schools and community groups throughout 2013.

New Maurice Wilkins Centre website

The Centre launched a new website in 2013 with refreshed content that showcases how the Centre's research tackles major human diseases, and how new technologies support this. The new website also highlights the Centre's achievements in building strategic collaborations between scientific disciplines and institutions and even with entire countries, and the ways in which the Centre supports industry and science education. The website will be developed further in 2014 and can be found at www.mauricewilkinscentre.org

Supporting the New Zealand science community

Maurice Wilkins Centre Prize for Chemical Science

The 2013 Maurice Wilkins Centre Prize for Chemical Science, sponsored by the Centre in partnership with the New Zealand Institute of Chemistry, was awarded to Professor Robin Smith, a Maurice Wilkins Centre investigator from the University of Otago, on the 14th November. The prize is awarded annually to a member of the NZIC who has made a significant contribution to chemical science in the past five years. The award highlights Professor Smith's significant contribution to organic chemistry, specifically in the area of medical research around free radical systems.

Thematic research symposia and workshops

During 2013 the Centre ran a number of thematic research symposia and workshops featuring national and international speakers:

Group A Streptococcus Symposium and Workshop

A Maurice Wilkins Centre symposium held in March 2013 attracted world experts to New Zealand to discuss group A streptococcus (the bacterium that causes rheumatic fever).

The two-day symposium began with a public session on the latest research into the biology of group A streptococcus and how it causes rheumatic fever and other diseases, the burden of disease in Australia and New Zealand, and potential vaccine strategies. The second part of the meeting was a closed workshop, aligned with the trans-Tasman strategy to fast-track the development of a vaccine targeting rheumatic fever, to discuss the way forward to identify the vaccine most likely to succeed. Speakers at the public session of the Group A Streptococcus Vaccine Symposium, held at The University of Auckland's Faculty of Medical and Health Sciences, included: Professor Shiranee Sriskandan (Imperial College London, UK), Professor Jonathan Carapetis (Telethon Institute for Child Health Research, Perth, Australia) and from the University of Auckland Professor John Fraser, Professor Ted Baker, Professor Diana Lennon and Associate Professor Thomas Proft.

See page 9 for more details on the symposium and for a full list of workshop participants see http://www.mauricewilkinscentre.org/media/34786/MWC-GAS-Vaccine-Workshop_Online.pdf

Auckland Cancer Research Network 2013 Winter School in Anticancer Drug development.

The aim of this ACRN Winter School, held on the 12th July 2013 at the University of Auckland, was to demonstrate how biological research, medicinal chemistry and clinical medicine integrate to develop therapies for cancer. The programme covered basic research, drug development and clinical concepts. Keynote speakers were Centre Director Prof Rod Dunbar, Dr Richard Furneaux (Callaghan Innovation), Dr Graeme Stevenson (Griffith University, Australia) and Prof Ramesh Ramanathan (TGEN, University of Arizona, USA). The WinterSchool was organised by Maurice Wilkins Centre investigators Dr Jack Flanagan and Dr Euphemia Leung along with Dr Marjan Askarian-Amiri.

Maurice Wilkins Centre Flagship workshops

During 2013 the Maurice Wilkins Centre ran five 'flagship' workshops on specific research topics of relevance to the Centre. The aim was to bring together the best New Zealand researchers and clinicians in each research area to brainstorm future directions and decide how best to work together to achieve outcomes to benefit New Zealand. Many of the ideas that came from these workshops have been incorporated into the Centre's proposed research programme from 2015 to 2020. In most cases this was the first time such high level groups had been convened to workshop a national research strategy under these themes.

- Workshops were held on the following topics;
- Tuberculosis – 29th April
- Melanoma – 29th May
- Diabetes and obesity – 16th August
- Protein and peptide engineering – 20th August
- Tumour microenvironment – 5th September

Technology workshops

During 2013 Maurice Wilkins Centre investigators ran three technology based workshops.

Flow Cytometry workshop

This workshop was held on the 22nd of April as a prelude to the International Society for Cellular Therapy annual meeting in Auckland.

The Maurice Wilkins Centre has a particular interest in cell therapy and supported the meeting by convening the flow cytometry workshop traditionally held before the main meeting. The Centre has deep skills in flow cytometry – a critical technique for identifying cells in mixtures and isolating those of interest, with New Zealand's leading flow cytometry suites at The University of Auckland and Malaghan Institute for Medical Research.

The keynote speaker at the workshop was Professor Stanley Riddell, an immunotherapy researcher and oncologist from the Fred Hutchinson Cancer Research Centre in the United States who spoke about the isolation and use of immune cell products for the treatment of cancer. The programme also featured: Prof. Derek Hart (ANZAC Research Insitute, Australia), Dr Allan Dietz (Mayo Clinic, USA), Dr John Foster (Owl Biomedicine, USA), Dr John Sharpe (CytonomeST, USA), Dr Adrian Smith (Centenary Institute, Australia), Dr Siok Tey (Queensland Insititute of Medical Research, Australia), Dr Christian Carson (Becton Dickinson, USA) and Prof. Rod Dunbar and Dr Anna Brooks (Maurice Wilkins Centre, University of Auckland).

The Centre provided travel grants for students from Otago University and the Malaghan Institute for Medical Research to attend this workshop.

Mass spectrometry symposium

The Maurice Wilkins Centre hosted a one-day symposium on modern mass spectrometry techniques and applications at The University of Auckland on Friday 6 September.

The symposium was free of charge for attendees and the Centre provided a number of grants for investigators based outside Auckland to travel to the event.

The focus was on the use of mass spectrometry in proteomics research, metabolomics and small molecules, and the emergence of new mass spectrometry technologies. The day concluded with a workshop on current mass spectrometry instrumentation in New Zealand.

Amongst the keynote speakers were Professor Dame Carol Robinson (University of Oxford), Professor Peter Derrick (University of Auckland), Associate Professor Kevin Downard (University of Sydney) and Associate Professor Bill Jordan (Victoria University of Wellington), all of whom are recognised experts in their respective areas. There was also a range of speakers from around New Zealand, describing both the mass spectrometry technologies with which they are currently working and some of their results.

International CellML workshop

CellML is an open standard language being developed by the Auckland Bioengineering Institute and international collaborators to store and exchange computer-based mathematical models of biological processes. The Maurice Wilkins Centre provided support for the 2013 International CellML Workshop, that was organised by Centre investigator Dr David Nickerson and held at Goldie Estate on Waiheke Island, Auckland.

The workshop provides an opportunity to update users on recent developments and discuss future work on the CellML standard with the user community. Delegates at the workshop in 2013 included visitors from the United Kingdom, United States, Australia, Germany, and France as well as MWC affiliates, and staff and students from the University of Auckland. Several more focussed meetings, on the ontological annotation of computational models and the use of CellML in the field of agent based modelling, were hosted by the Auckland Bioengineering Institute before and after the workshop to take advantage of the large number of international visitors travelling to Auckland for the workshop.

Conferences, meetings and organisations

Scientific conferences, meetings and networks are important fora to share knowledge and form collaborative relationships. In addition to the symposia and workshops that the Centre and its investigators convene (see pages 24 and 25) the Maurice Wilkins Centre supports national and international scientific meetings held in New Zealand as well as smaller local scientific meetings and networks.

In 2013 the Maurice Wilkins Centre provided support for:

- Queenstown Research Week. In 2013 this event incorporated the Queenstown Molecular Biology Meeting and satellite meetings focussed on enzyme engineering and evolution, redox biology and reactive oxygen species, heart research, epigenetics, genomic medicine and the Webster Centre for Infectious Diseases Symposium: Of

Microbes and Men-Translational Medical Microbiology in the 21st Century. This week of scientific meetings attracted over 1000 registrations from national and international delegates and speakers including a large number of Maurice Wilkins Centre investigators. The Centre is the premier academic sponsor for this event that provides an important opportunity for Centre investigators to meet and hear about some of the latest national and international research. The Centre also provides sponsorship for New Zealand secondary school teachers to attend the Queenstown Molecular Biology meeting (See page 21). In 2013 the Centre provided additional sponsorship to the Webster Centre for Infectious Diseases Symposium: Of Microbes and Men towards student travel awards.

- 43rd Annual Scientific Meeting of the Australasian Society for Immunology (ASI). This meeting was held in Wellington in December. This international meeting attracted over 400 delegates from all over the world including many international leaders in biomedical and clinical research and provided a key interface for colleagues from industry, university and independent research organisations to come together. The Centre sponsored Professor Kees Melief from Leiden University in The Netherlands, who was a keynote speaker at the meeting.

- 7th Australasian Society of Virology Conference. This conference was held in Queenstown in December 2013; the first time the biennial meeting has been held in NZ. The meeting provided an important opportunity to highlight NZ virology and wider biological sciences to an Australian and international audience. The Centre provided sponsorship for the student poster sessions at the meeting.

- New Zealand Society for Oncology 2013 Conference. This annual national conference was held in Dunedin in July 2013 and brings together oncologists and cancer researchers. The Centre provided sponsorship for keynote speaker Dr Peter Hersey from the University of Sydney, Australia.

- Biolive 2013. This is the biennial conference for primary, secondary and tertiary biology educators run by the Biology Educator's Association of New Zealand (BEANZ). The conference was held in Christchurch in 2013. The Centre provided sponsorship as well as contributing USB sticks loaded with presentations from the Maurice Wilkins Centre Teacher Professional Development workshops (See story page 14).

- NZBIO Asia Partnering Workshop. The aim of this workshop, held in September 2013, was to help companies understand the partnering landscape in key Asian countries. It featured speakers with proven track records of building partnerships across Asia. The Centre provided sponsorship for the workshop.

- Analytical Ultracentrifuge Workshop. New Zealand's first analytical ultracentrifugation workshop was held at the University of Canterbury on the 15th and 16th of October and featured a presentation from Professor Tom Laue (University of New Hampshire), one of the original designers of the current analytical ultracentrifuge instrument, who has pioneered this research for three decades. The Centre provided sponsorship to enable investigators from others areas to attend the workshop.

- **Regenerative Medicine Workshop**. This workshop was held on the 26th April 2013 in association with the International Society for Cellular Therapy (ISCT) annual meeting in Auckland. Regenerative medicine aims to help the body to regenerate damaged tissues using cells and/or bioactive compounds. The workshop, organised by the New Zealand Consortium for Medical Device Technologies (CMDT) featured local and international speakers. The Centre provided sponsorship towards the running costs of the workshop.
- **Stem Cell Research Network.** This network, initiated in 2012, aims to foster a collegial and collaborative network among researchers with an interest in all aspects of stem cell research. In 2013 the Centre provided support to enable a network mini-symposium in November, organised by Centre investigators Dr Hilary Sheppard and Dr Vaughan Feisst.

Service

Maurice Wilkins Centre investigators support both the national and international science communities through service in leadership roles and on many advisory boards and panels.

National roles

In 2013 Maurice Wilkins Centre investigators served in advisory and governance roles in many New Zealand organisations including;

- New Zealand Branch of the Australasian Society for Immunology
- Biomolecular Interaction Centre (University of Canterbury)
- Cancer Society of New Zealand
- Canterbury Medical Research Foundation
- Environmental Protection Authority HSNO Committee
- Freemasons Roskill Trust
- Health Research Council of New Zealand
- Institute of Environmental Science and Research
- Landcare Research
- Leukaemia and Blood Cancer NZ Scientific Committee
- L'Oreal-UNESCO Women in Science Fellowships in Australia and NZ
- Maurice and Phyllis Paykel Trust
- Melanoma Network of New Zealand
- Middlemore Tissue Bank Scientific Advisory Board

- Ministry of Health – Advisory Groups
- Ministry of Business, Science and Employment
- National Institute of Water & Atmospheric Research
- New Zealand Bioinformatics Institute
- New Zealand Chemical Education Trust
- New Zealand Genomics Ltd
- New Zealand Hygiene Foundation
- New Zealand Institute for Rare Disease Research Ltd
- New Zealand Orthopaedic Association
- New Zealand Society for Biochemistry and Molecular Biology
- New Zealand Society for Oncology
- Queenstown Molecular Biology Meetings Society
- Royal Society of New Zealand
- Rutherford Foundation
- Tertiary Education Commission (PBRF assessment panels)
- The New Zealand Microbiological Society
- Wellington Health and Biomedical Research Society
- Wellington Medical Research Foundation

International roles

In 2013 members of the Maurice Wilkins Centre served in more than 100 advisory, editorial and governance roles in international organisations based in the United States of America, Australia, the United Kingdom, the Netherlands, Denmark, Canada, France, Singapore, Sweden, Switzerland, Spain, Qatar and Romania.

Organisational Development

Research seeding programme

One of the Maurice Wilkins Centre's main objectives is to encourage early-stage research collaborations between investigators from different scientific disciplines, achieved through its contestable research seeding programme. Three rounds of the programme were held in 2013 and 19 new projects were approved.

New initiatives

The Maurice Wilkins Centre fosters new multidisciplinary collaborative research involving Centre investigators, by providing working expenses to initiate work on ground-breaking projects. The aim is to spark projects that will grow into highly innovative and sustainable research programmes.

Projects awarded funding in 2013:

- A new vision for the future: turning human iPS cells into keratocytes; Davidson, Green and Holm, University of Auckland; in collaboration with Associate Professor Trevor Sherwin, University of Auckland
- The development of nucleoside-analogue drug screening systems in Saccharomyces cervisiae: Atkinson, Victoria University of Wellington; Furneaux, Callaghan Innovation; in collaboration with Dr James Matthews, Victoria University of Wellington
- Mucosal associated invariant T(MAIT) cells in sinus mucosa of health and chronic rhinosinusitis: Douglas, Dunbar and Brooks, University of Auckland; in collaboration with Dr Raymond Kim, Dr Ravi Jain and Dr Nikola Lilic, University of Auckland
- Novel anti-TB therapies: Wiles and Denny, University of Auckland
- Design and synthesis of novel and selective PI3 Kinase inhibitors: Furneaux, Luxenburger and Johnston, Callaghan Innovation; Flanagan, Shepherd, Buchanan and Jamieson, University of Auckland
- Peptide engineering of a stable Connexin43 mimetic: Brimble, Harris and Green, University of Auckland; in collaboration with Prof Louise Nicholson and Prof Helen Danesh-Meyer, University of Auckland
- Changes in the cellular architecture of human lymph nodes with senescence: McCall and Ahmadi, University of Otago; Dunbar, University of Auckland; in collaboration with Professor Mark Stringer, University of Otago and Dr Martha Nicholson, Southern Community Laboratories

Access to advanced equipment

The cost of accessing advanced equipment can be a barrier to scientific discovery. Through this category, Maurice Wilkins Centre investigators can access the Centre's advanced equipment anywhere in New Zealand to initiate exciting new projects.

Projects awarded funding in 2013:

- Nitrogen metabolism: a new frontier for anti-TB drugs; Cook, University of Otago; Arcus, University of Waikato; in collaboration with Dr Jennifer Robson and Mr Michael Petridu, University of Otago
- The impact of the nasal microbiome on chronic rhinosinusitis: Douglas, University of Auckland; in collaboration with Dr Mike Taylor, Dr Raymond Kim and Ms Kristi Biswas, University of Auckland
- Comprehensive DNA variant analysis of the CYP2C19 pharmacogene: Kennedy, University of Otago, Christchurch; Helsby, University of Auckland
- Sequencing the genomes of a panel of well characterised sequence type 131 Escherichia coli strains causing disease in Auckland: Wiles, Williamson and Hurley, University of Auckland
- Evaluation of patient blood microRNAs for the diagnosis of non-occlusive mesenteric ischaemia in cardiac surgery patients: Windsor, Phillips and Blenkiron, University of Auckland; in collaboration with Dr Michael Gillham, Auckland District Health Board
- Whole-genome sequencing of drug-resistant Mycobacterium tuberculosis strains to develop rapid diagnostics for drug-resistant TB: Cook and Aung, University of Otago; Arcus, University of Waikato; Roberts, Auckland District Health Board; in collaboration with Prof John Crump and Prof Philip Hill, University of Otago and Prof Kyi Kyi Thinn and Dr Thanda Tun, University of Medicine 1, Myanmar
- Exome sequencing to guide individualised therapy of patient derived xenografts: Jamieson, Lawrence and Findlay, University of Auckland
- Optimising a domain seeking technology with fluorescence-activated cell sorting: Bulloch and Kingston, University of Auckland
- Synthesising calcitonin analogues to investigate the binding mode of calcitonin to its receptor: Gingell, Hay, Harris and Brimble, University of Auckland
- D-peptide synthesis for racemic crystallisation of short collagen mimetic motifs: Valery, Dobson and Gerrard, University of Canterbury; Harris and Brimble, University of Auckland
- Whole-genome sequencing of a recently emerged community-associated Sequence Type (ST)5-MRSA-IV in New Zealand: Williamson and Fraser, University of Auckland; in collaboration with Dr Stephen Ritchie and Peter Tsai, University of Auckland
- Dermal mesenchymal stem cells and their differentiated progeny: Feisst, Brooks and Sheppard, University of Auckland; in collaboration with Dr Michelle Locke, Counties Manukau District Health Board and the University of Auckland

New investigators

In 2013, the Maurice Wilkins Centre continued to strengthen its national network of investigators with 38 new associate investigators invited to join the Centre:

- Professor Michael Baker, Department of Public Health, University of Otago, Wellington
- Professor Mike Berridge, Malaghan Institute of Medical Research
- Mr Michael Booth, Waitemata District Health Board
- Professor Vicky Cameron, Christchurch Heart Institute, University of Otago, Christchurch
- Dr Renwick Dobson, School of Biological Sciences, University of Canterbury
- Professor Paul Donaldson, Department of Optometry and Vision Science, University of Auckland
- Dr David Goldstone, School of Biological Sciences, University of Auckland
- Dr Chris Hall, Department of Molecular Medicine and Pathology, University of Auckland
- Dr Jacquie Harper, Malaghan Institute of Medical Research
- Dr Joanne Harvey, School of Chemical and Physical Sciences, Victoria University of Wellington
- Dr Kevin Hicks, Auckland Cancer Society Research Centre, University of Auckland
- Associate Professor Bill Jordan, School of Biological Sciences, Victoria University of Wellington
- Dr Roslyn Kemp, Department of Microbiology and Immunology, University of Otago
- Dr Jackie Kendall, Auckland Cancer Society Research Centre, University of Auckland
- Dr Professor Martin Kennedy, Department of Pathology, University of Otago, Christchurch
- Dr Jeremy Krebs, Department of Medicine, University of Otago, Wellington
- Goetz Laible, AgResearch
- Dr Ben Lawrence, School of Medical Sciences, University of Auckland
- Dr Donia Macartney-Coxson, Institute of Environmental Science and Research

- Dr Peter Mace, Department of Biochemistry, University of Otago
- Associate Professor Tony Merriman, Department of Biochemistry, University of Otago
- Professor John Miller, School of Biological Sciences, Victoria University of Wellington
- Dr Gillian Norris, Institute of Molecular BioSciences, Massey University
- Associate Professor Peter Northcote, School of Chemical and Physical Science, Victoria University of Wellington
- Dr Bjorn Oback, AgResearch
- Dr Grant Pearce, School of Biological Sciences, University of Canterbury
- Dr Lifeng Peng, School of Biological Sciences, Victoria University of Wellington
- Dr Jo Perry, Liggins Institute, University of Auckland
- Associate Professor Jasna Rakonjac, Institute of Fundamental Sciences, Massey University
- Dr Sally Roberts, Auckland District Health Board
- Dr Evelyn Sattlegger, Institute of Natural & Mathematical Sciences, Massey University
- Associate Professor Andrew Shelling, Department of Obstetrics and Gynaecology, University of Auckland
- Dr Michael Steward, Callaghan Innovation
- Dr Bridget Stocker, School of Chemical and Physical Sciences, Victoria University of Wellington
- Associate Professor Paul Teesdale-Spittle, School of Biological Sciences, Victoria University of Wellington
- Dr Mattie Timmer, School of Chemical and Physical Sciences, Victoria University of Wellington
- Dr Debbie Williamson, Department of Molecular Medicine and Pathology, University of Auckland
- Dr Tim Woodfield, Department of Orthopaedic Surgery, University of Otago, Christchurch

Equipment and facilities

The Maurice Wilkins Centre was awarded $4.3 million of capital equipment funding in 2002 and a further $2.7 million in 2007, to purchase capital equipment, as part of the CoRE funding. This investment in capital equipment has enabled new research to be undertaken, fostered national collaborations and contributed to many research publications.

While primarily used by Centre investigators, this capital equipment has also provided valuable services for many New Zealand biotechnology companies and researchers based at CRIs and Health Boards.

In 2013 the Centre client list included

- Auckland Clinical Studies Ltd
- Callaghan Innovation Research Ltd
- MP Biomedicals NZ Ltd
- Lanzatech NZ Ltd
- Waitemata District Health Board
- Auckland District Health Board
- Counties Manukau District Health Board
- Waikato District Health Board
- Nelson-Marlborough District Health Board
- Southern Community Laboratories

Human capability

The multidisciplinary and collaborative nature of the Maurice Wilkins Centre research programme provides an excellent training environment for the young scientists and students who are our future science leaders.

PhD student support

The Maurice Wilkins Centre supports a large cohort of PhD and MSc students within its associated research groups by providing funds for stipends, working expenses and travel, as well as opportunities to access specialised research equipment and facilities. In 2013 the Centre provided full or partial stipends for 32 PhD students.

Technical training opportunities

In order to maintain a world class research programme it is important that Maurice Wilkins Centre investigators and students keep up to date with international developments in their fields. The Centre provides support for staff and students to travel to conferences, technical workshops and to visit other laboratories in New Zealand and overseas to acquire new skills and techniques.

In late 2011 the Centre launched a new scheme to help its early-career scientists train in cutting-edge technology, and share what they learn with their New Zealand colleagues. The contestable programme supports affiliate investigators' travel to international workshops and laboratories to learn new technical skills. A criterion for a successful application is that the investigator must present a plan for how they will disseminate their new knowledge and skills to other members of the New Zealand science community on their return.

During 2013, three affiliate investigators travelled under the scheme:

- Dr David Nickerson leads the Auckland Renal Physiome project at the Auckland Bioengineering Institute, at the University of Auckland. He attended the HARMONY 2013 workshop, held at the University of Connecticut Health Centre. HARMONY (Hackathons on Resources for Modeling in Biology) is organised by the Computational Modeling in Biology Network (COMBINE), which is an initiative to coordinate the development of various community standards and formats for computational models. David presented a tutorial on the Physiome Model Repository (the development of which is partly funded by the Maurice Wilkins Centre) on the first morning of the workshop.

  "My attendance at HARMONY was very successful in broadening my knowledge and understanding of all the COMBINE standards and many associated software tools and public repositories," said David, and "all MWC members should feel free to contact me if they would like to learn more about any of the COMBINE standards, how the standards and tools might be able to contribute to their work". As a result of attending this event, David has formed on-going collaborations and has been invited to help organise and participate in further international workshops and tutorials.

- Dr Debbie Williamson is a clinical microbiologist undertaking her PhD at the University of Auckland, investigating the molecular basis of Staphylococcus aureus skin and soft tissue infections (SSTI). She attended the course 'Molecular Basis of Bacterial Infection: Contemporary Research Approaches', held at the Wellcome Trust Genome Campus, Hinxton, Cambridge, UK. The course focussed on the concepts and techniques used in studies of the molecular basis of bacterial infection, with emphasis on contemporary high-throughput approaches. Dr Williamson was able to learn bioinformatics analysis skills which she is already putting to use in the analysis of thirty Staphylococcus aureus genomes, sequenced as part of a Maurice Wilkins Centre research seeding grant, and on a project involving human Escherichia coli isolates. The course also allowed invaluable networking opportunities, with Dr Williamson meeting "one of the top global researchers in the area of S. aureus genomics, and we are in discussions about several collaborative projects".

- Jingshu Xu, a Maurice Wilkins Centre-funded PhD student from the University of Auckland, travelled to the Centre for Advanced Discovery and Experimental Therapeutics (CADET) at the University of Manchester, UK. During her eight-week stay, Jingshu was able to carry out comprehensive metabolic profiling of human brain samples from patients with Alzheimer's disease and matched control donors. The experiments she performed were able to reveal striking differences in the metabolic profiles of Alzheimer's disease patient's brains in comparison to the matched control donor brains, including in levels of free glucose, sorbitol and fructose in the brain. These findings are being used for the preparation of at least two manuscripts, and these results and publications will be used for applications for further funding to investigate Alzheimer's disease patients.

During 2013 the movement of PhD students between the laboratories of Maurice Wilkins Centre investigators across New Zealand has continued. This has been largely due to the requirement that PhD students funded through the multidisciplinary training category of the Centre's research seeding programme spend time working in more than one scientific discipline.

International visits

The Maurice Wilkins Centre runs an international engagement programme to build partnerships with priority international institutions that benefit the Centre's investigator network. In 2013 this involved sending a delegation of Centre investigators to Shanghai in China and hosting a number of visiting delegations in New Zealand (see page 26). The Centre also hosts visits from international and national scientists and officials.

International Scientists

The Maurice Wilkins Centre hosts visits from international scientists so that they can share their knowledge and research experiences with the New Zealand research community and establish research links.

Professor Dame Carol Robinson

Professor Dame Carol Robinson is a Royal Society Research Professor, Doctor Lee's Professor Elect at the University of Oxford and a Dame Commander of the Order of the British Empire. Her research is focussed on gaining new insights into protein structure, function and interactions by means of mass spectrometry. Professor Robinson visited New Zealand in September 2013 and was hosted by the School of Chemical Sciences at the University of Auckland, where she is an Adjunct Professor, and the Maurice Wilkins Centre. During her visit she gave a keynote presentation at the Centre's mass spectrometry symposium as well as seminars to staff and students at the University of Otago and the University of Auckland (see page 36 for more details of the mass spectrometry symposium).

Professor Cornelius Melief

Professor Cornelius (Kees) Melief is a Professor of Internal Medicine specialising in immunohematology at Leiden University, The Netherlands, and Chief Scientific Officer of ISA Pharmaceuticals. His research aims to develop T cell-based immunotherapy of cancer and he is a world leader in the development and manufacture of synthetic long peptide vaccines for clinical use. Professor Melief visited New Zealand in December and featured as a keynote speaker at the 43rd Annual Scientific Meeting of the Australasian Society for Immunology (ASI), held in Wellington before travelling to Auckland to provide expert advice on further development of the GMP peptide facility and peptide therapeutic programmes in the Maurice Wilkins Centre.

Professor Jonathan Carapetis

Professor Jonathan Carapetis is a paediatrician and infectious disease specialist and currently is Director of the Telethon Kids Institute in Perth, Australia. He has made an international contribution and commitment to the reduction of rheumatic heart disease and is taking a leadership role in a trans-Tasman project to investigate potential vaccines for rheumatic fever. He visited New Zealand in March 2013 as a key participant in the international Group A Streptococcus Vaccine Symposium convened by the Maurice Wilkins Centre at the University of Auckland. Professor Carapetis also gave a presentation in the public session of this symposium (see page 13 for a story on this symposium).

Maurice Wilkins Centre investigators also hosted the following visitors to the centre in 2013:

- Professor Paul Alewood, University of Queensland, Australia
- Dr Muriel Amblard, University of Montpellier, France
- Professor Bill Andrews, Sierra Sciences, LLC, USA
- Dr Michael Batzloff, Griffith University, Australia
- Associate Professor Simon Blakey, Emory University, USA
- Dr Gerry Brown, Pan-Provincial Vaccine Enterprise (PREVENT), Canada
- Dr Christian Carson, BD Biosciences, USA
- Dr Tania Crombet-Ramos, Center of Molecular Immunology, Havana, Cuba
- Dr John Cumming, AstraZeneca R&D, UK
- Professor Jim Dale, University of Tennessee Health Science Center, USA
- Professor Ke Ding, Guangzhou Institute of Biomedicine and Health, China
- Dr Bernard De Bono, University College London, UK
- Dr Robert Deans, Athersys Inc., USA
- Dr Allan Dietz, Mayo Clinic, USA
- Associate Professor Kevin Downard, University of Sydney, Australia
- Dr John Foster, Owl Biomedicine, USA
- Professor Mike Good, Griffith University, Australia
- Dr Guido Grandi, Novartis Vaccines and Diagnostics, Italy

- Professor Derek Hart, ANZAC Research Institute, Australia
- Associate Professor Thomas Huber, Australian National University
- Dr Normando E. Iznaga-Escobar, InnoMab Pte Ltd, Singapore
- Professor Henk ter Keurs, University of Calgary, Canada
- Dr Yang Liu, Loughborough University, UK
- Prof Kris Matyjaszweski, Carnegie Mellon University, USA
- Dr Mark McCall, EPSRC Doctoral Training Centre in Regenerative Medicine, UK
- Professor Andrew McCulloch, University of California San Diego, USA
- Professor David O'Hagan, University of St Andrews, UK
- Professor David Paterson, University of Oxford, UK
- Dr Audino Podda, Novartis Vaccines Institute for Global Health, Italy
- Professor Stanley Riddell, Fred Hutchinson Cancer Research Centre, USA
- Professor Mark Rizzacasa, University of Melbourne, Australia
- Dr Allan Saul, Novartis Vaccines Institute for Global Health, Italy
- Dr Leonid Sazanov, MRC Laboratory of Molecular Biology, Cambridge, UK.
- Dr John Sharpe, CytonomeST, USA
- Dr Pierre Smeesters, Murdoch Childrens Research Institute, Australia
- Dr Adrian Smith, Centenary Institute, Australia
- Professor Shiranee Sriskandan, Imperial College London, UK
- Dr Andrew Steer, Royal Children's Hospital, Melbourne, Australia
- Professor Gilles Subra, University of Montpellier, France
- Dr Siok Tey, Queensland Institute of Medical Research, Australia
- Dr Christopher Thompson, Medical College of Wisconsin, USA
- Dr Claire Waddington, Telethon Institute for Child Health Research, Australia
- Prof Mark Walker, The University of Queensland, Australia
- Associate Professor John Wherry, University of Pennsylvania, USA
- Professor David Williams, EPSRC Doctoral Training Centre in Regenerative Medicine, UK
- Prof Donghai Wu, Guangzhou Institute of Biomedicine and Health, China

International science delegations

- *2nd New Zealand-Japan Joint Immunology Workshop:*

  Speakers from Japan:

  Chiba University; Professor Toshinori Nakayama, Professor Takeshi Tokuhisa, Associate Professor Koichi Hirose, Associate Professor Shinichiro Motohashi

  Riken Centre for Allergy and Immunology; Professor Takashi Saito, Dr Yasuyuki Ishii, Dr Shinichiro Fujii, Dr Shohei Hori and Dr Takaharu Okada

  Speakers from New Zealand:

  Malaghan Institute for Medical Research; Professor Graham Le Gros, Professor Franca Ronchese, Associate Professor Ian Hermans, Dr Elizabeth Forbes-Blom and Dr Jacquie Harper

  Victoria University of Wellington; Associate Professor Anne La Flamme

  Callaghan Innovation; Dr Gavin Painter

  University of Otago; Professor Sarah Hook, Dr Sarah Young, Dr Roslyn Kemp and Dr Joanna Kirman

  University of Auckland; Professor Rod Dunbar, Dr Gib Bogle, Professor John Fraser and Dr Christopher Hall

International and national officials and delegations

In 2013 Maurice Wilkins Centre investigators hosted or participated in visits by the following officials and delegations:

- *Jiangxi Province Delegation, December 2013:*

  Mrs Xueqin Guo, Director General, Department of Science and Technology of Jiangxi Province, Mr Wenxin Li, Division Director, Department of Science and Technology of Jiangxi Province, Mrs Xiaonan Zhang, Consultant, Department of Science and Technology of Jiangxi Province, Mr Gang Zhou, Deputy Director, Science and Technology Bureau of Nanchang Municipal Government, Jiangxi Province, Mr Shiyong Wang, Deputy Director, Department of Science and Technology of Jiangxi Province and Mr Junyong Zhang, Deputy Director, Test and Analysis Research Institute of Jiangxi Province.

- *Beijing Biopharma Delegation, December 2013:*

  Mr Zhou Xiaobai, Vice Director-General, Beijing Scientific and Technical Cooperation Center, Ms Lu Aili, Deputy Director-General, Beijing Drug Administration, Mr Tang Jian, Director, Beijing Municipal Science & Technology Commission, Ms Cui Yuqin, Director-General, Beijing Municipal Office for Science and Technology Awards, Mr Liu Youlin, Division Chief, Beijing Scientific and Technical Cooperation Centre, Mr Cheng Wei, Assistant to Director-General, Beijing Pharma and Biotech Center and Mr Shi Hepeng, CEO, Beijing Pearl Biotechnology Limited Liability Company

External funding

Many of the projects within the Maurice Wilkins Centre research programme are supported by additional grants from other funding sources. The Centre also targets a proportion of its research budget to seed and develop new projects to the point where they will become successful in securing competitive funding.

New Zealand funding

In 2013 Wilkins Centre investigators were awarded new grants for research projects worth more than $48 million from New Zealand funding sources for research projects to be carried out over the next one to five years, including $30 million from the Health Research Council of New Zealand, $11.7 million from the Ministry of Business, Innovation and Employment and $5.6 million from the Marsden Fund.

International funding

In 2013 Wilkins Centre investigators secured new funding of $1.5 million from international sources to support future research.

Governance and management

Governing Board

In 2013 the Board Members were; Mr Bill Falconer (Chair), Professor Grant Guilford (University of Auckland), Professor Jane Harding (University of Auckland), Professor Louise Nicholson (University of Auckland), Ms Maxine Simmons (Biocatalyst Ltd) and Professor Warren Tate (University of Otago).

Professor Grant Guilford's term with the Board ended in 2013 when he took up his new position as Vice-Chancellor of Victoria University of Wellington in early 2014. Professor Guilford joined the Board in 2010 when he was appointed as Dean of Science at the University of Auckland. The Centre gratefully acknowledges Professor Guilford's extensive advice and encouragement during his four year term.

During 2013 the Board met three times in May, August and October. The Board monitored progress of the Maurice Wilkins Centre research programme and its compliance with the funding mandate and budget. The Board received the report of the Centre's Scientific Advisory Board, that met in September 2012, and considered the recommendations of the report regarding the future strategies and development of the Centre's research programme. The Board also provided advice and direction throughout 2013 on the Centre's international engagement programme and development of the Centre's bid for renewed CoRE funding that was submitted in December 2013.

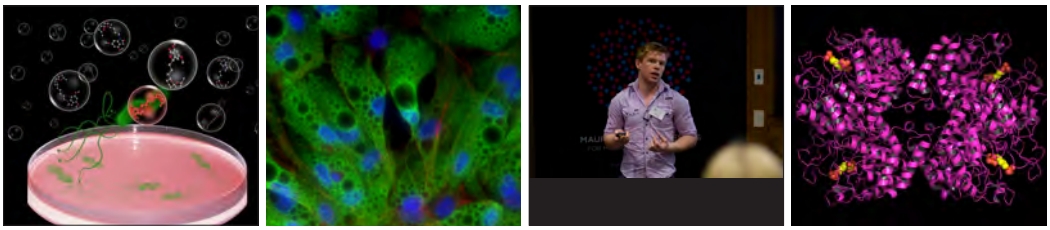
Management Committee

The Maurice Wilkins Centre Management Committee consists of the Centre's principal investigators; Professors Rod Dunbar (Director), Peter Shepherd (Deputy Director), Ted Baker, Margaret Brimble, Garth Cooper, Bill Denny, John Fraser and Peter Hunter.

The committee controls the operation of the Centre, under the guidance of the Governing Board and the Scientific Advisory Board. The Committee met nine times during 2013.

In 2013 Professor John Fraser stepped down as Deputy Director of the Maurice Wilkins Centre, a role which he had held since the founding of the Centre in 2002. He will continue to be actively involved in the Centre and the Management committee as a principal investigator. The Centre gratefully acknowledges Professor Fraser's outstanding contributions as Deputy Director over the past 11 years.

Professor Peter Shepherd was appointed as the new Deputy Director of the Maurice Wilkins Centre. Professor Shepherd joined the Centre in 2006 as principal investigator and has been instrumental in the Centre's successful international engagement programme as well as playing a leading role in the science education programme for secondary school biology teachers across New Zealand.



Research Outputs

Publications

In 2012 research outputs from Maurice Wilkins Centre investigators included more than 508 peer-reviewed scientific papers and reviews published in international journals, and numerous patents. Research directly supported by the Maurice Wilkins Centre generated the following 119 scientific papers and eight patents published or filed.

Papers and reviews

1. Affara, M., Sanders, D., Araki, H., Tamada, Y., Dunmore, B. J., Humphreys, S., Imoto, S., Savoie, C., Miyano, S., Kuhara, S., Jeffries, D., Print, C., & Charnock-Jones, D. S. Vasohibin-1 is identified as a master-regulator of endothelial cell apoptosis using gene network analysis. *BMC Genomics* (2013) **14**(1).

2. Aitken, H. R. M., Furkert, D. P., Hubert, J. G., Wood, J. M., & Brimble, M. A. Enantioselective access to benzannulated spiroketals using a chiral sulfoxide auxiliary. *Organic and Biomolecular Chemistry* (2013) **11**(31): 5147-5155.

3. Aitken, H. R. M., Johannes, M., Loomes, K. M., & Brimble, M. A. Synthesis of leptosin, a glycoside isolated from manuka honey. *Tetrahedron Letters* (2013).

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5. Blackmore, N. J., Reichau, S., Jiao, W., Hutton, R. D., Baker, E. N., Jameson, G. B., & Parker, E. J. Three sites and you are out: Ternary synergistic allostery controls aromatic amino acid biosynthesis in mycobacterium tuberculosis. *Journal of Molecular Biology* (2013) **425**(9): 1582-1592.

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7. Bobby, R., Medini, K., Neudecker, P., Lee, T. V., Brimble, M. A., McDonald, F. J., Lott, J. S., & Dingley, A. J. Structure and dynamics of human Nedd4-1 WW3 in complex with the alphaENaC PY motif. *Biochimica et Biophysica Acta - Proteins and Proteomics* (2013) **1834**(8): 1632-1641.

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10. Brooks, C. R., Van Dalen, C. J., Hermans, I. F., & Douwes, J. Identifying leukocyte populations in fresh and cryopreserved sputum using flow cytometry. *Cytometry Part B - Clinical Cytometry* (2013) **84 B**(2): 104-113.

11. Buchanan, C. M., Dickson, J. M. J., Lee, W. J., Guthridge, M. A., Kendall, J. D., & Shepherd, P. R. Oncogenic Mutations of p110α Isoform of PI 3-Kinase Upregulate Its Protein Kinase Activity. *PLoS ONE* (2013) **8**(8): e71337.

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13. Bunker, R. D., Bulloch, E. M. M., Dickson, J. M. J., Loomes, K. M., & Baker, E. N. Structure and function of human xylulokinase, an enzyme with important roles in carbohydrate metabolism. *Journal of Biological Chemistry (*2013) **288**(3): 1643-1652.

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16. Castell, A., Short, F. L., Evans, G. L., Cookson, T. V. M., Bulloch, E. M. M., Joseph, D. D. A., Lee, C. E., Parker, E. J., Baker, E. N., & Lott, J. S. The substrate capture mechanism of mycobacterium tuberculosis anthranilate phosphoribosyltransferase provides a mode for inhibition. *Biochemistry* (2013) **52**(10): 1776-1787.

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Patents

Patents published

1 Rewcastle, G. W., Gamage, S. A., Flanagan, J. U., Giddens, A. C., & Tsang, K. Y. Pyrimidinyl and 1,3,5-triazinyl benzimidazole sulfonamides and their use in cancer therapy. US Patent Application 8,461,158 B2, 2013.

2. Buchanan, C. and G. Cooper. Vesiculins. US Patent Application 8,618,051 B2, 2013.

Patents filed

1. Brimble, M.A., Dunbar, P. R., Harris, P. W. R., Williams, G.M. and Wright, T.H. Peptide Conjugates and Conjugation Process. NZ Patent Application 612654, 2013.

2. Hopkins, B. Bova, S., Cavali, M., Laita, O., Brimble, M. A. and Rennison, D. Preparation of Norbormide Analogs as Rodenticides. PCT International Application, WO 2013133726, 2013.

3. Williams, G.M., Brimble, M.A. Preparation of Polypeptide Derivative, especially Synthetic Vesiculin Polypeptide, Insulin Agonists via Regioselective Formation of Disulfide bonds for Treating Glucose Metabolism Diseases. PCT International Application, WO 2013128391, 2013.

4. Gladding, P., Jullig, M. Villas-Boas, S. El-Jack, S. Methods of diagnosis and treatment. US Patent Application 13/837,078, 2013.

5. Lu, J., Liu, D., Guan, J., Brimble, M. A., Harris, P. W. R., Huang, B. 'Application of cGP and Derivatives in Preparing Medicine for Inhibiting Tumor growth and Regeneration' Faming Zhuanli Shenqing, CN 103100080, 2013.

6. Ackerley, D.F., Ashoorzadeh, A., Copp, J. N., Guise, C. P., Mowday, A. M., Patterson, A. V., Smaill, J. B., Williams, E. M. Novel prodrugs and methods of use thereof PCT/NZ2013/000150, 2013.

7. Smaill, J.B., Patterson, A.V., Ashoorzadeh, A., Guise, C.P., Mowday, A.M., Ackerley, D.F., Copp, J.N., Williams, E. Novel prodrugs and methods of use thereof. PCT International Application, 2013.

Presentations

The international significance of the research being undertaken by Maurice Wilkins Centre investigators and their teams is demonstrated by the more than 190 invitations to give international and national presentations in 2013. The presentations included invited lectures at conferences and seminars at academic institutions in Australia, Belgium, Chile, China, Denmark, France, Germany, India, Italy, Japan, Malaysia, Mexico, the Netherlands, Norway, Portugal, Singapore, Thailand, Turkey, the United Kingdom, the United States of America and New Zealand, as shown in the diagram below

Presentation highlights

Significant presentations given by Maurice Wilkins Centre investigators in 2013 include:

- Professor Ted Baker was invited to give the plenary lecture 'Surprises from the synchrotron: discovering novel chemistry and mechanisms in proteins' to the Australian Synchrotron User Meeting, held in Melbourne, Australia in November 2013.
- Professor Margaret Brimble was invited to give multiple plenary lectures in 2013. She delivered the lecture 'Synthesis of Benzanulated Spiroketal Natural Products' at the Queensland Institute of Molecular Bioscience Annual Symposium in Brisbane, Australia, and also gave the lecture 'Nature's Medicine Chest: Opportunities for Drug Discovery' as part of the University of Auckland's 2013 Winter Lecture Series. She presented the lecture 'Mastering Molecular Chess to Mine Nature's Medicine Chest' in Auckland, Wellington, Christchurch, Dunedin, Palmerston North, Wanaka and Nelson for the 2013 Rutherford Lecture Tour. She also gave a keynote address, 'Synthesis of Benzanulated Spiroketal Natural Products' at the 47th IUPAC General Assembly in Istanbul, Turkey.

- Professor Bill Denny was invited to give three plenary lectures in 2013: the lecture 'Five drug development projects in the ACSRC' at the Drug Discovery and Development Symposium at the University of South Australia, Adelaide, Australia; '2nd Generation analogues of the 'new' TB drugs PA-824 and bedaquiline' at the Australasian Tuberculosis Conference in Auckland in November; and the address 'Drug development in a University setting' at the Australasian Society of Clinical and Experimental Pharmacologists and Toxicologists (ASCEPT) Conference in Melbourne, Australia in December.
- Professor Rod Dunbar was invited to deliver a plenary lecture at the Australasian Society for Immunology (ASI) Annual Scientific Meeting in December 2013, entitled 'Invading the labyrinth – tumour cells in the lymph node microenvironment'.
- Professor John Fraser was invited to give the Burnet Oration at Australasian Society for Immunology (ASI) Annual Scientific Meeting in December 2013, entitled 'A reflection on 40-years of immunology from down-under'.
- Professor Peter Hunter was invited to give five keynote and one plenary lectures on his work in bioengineering in meetings held in 2013: the Engineering in Medicine and Biology Society Annual International Conference (Osaka, Japan); the Health Systems Complexity Symposium (Singapore); the International Congress of Physiological Sciences (Birmingham, UK); the IBM Current Challenges in Computing Conference (Napa Valley, California, USA); the Cardiac Physiome Conference (Bar Harbor, USA); and the International Conference on Biomedical Engineering Conference (Singapore).
- Professor Colin Green was invited to give three keynote lectures in 2013: the Franco-Belgian-British meeting on blood-brain interfaces (Arras, France); the International Gap Junction Conference (Charleston, South Carolina); and the Chilean Society for Cell Biology (Puerto Varas, Chile).
- Associate Professor Cris Print was invited to give two keynote lectures in 2013. He gave the lecture 'Genomic Medicine: an exciting borderland between laboratory research and the clinic' at the Haematological Society of Australia and New Zealand Scientific Meeting, held in Queensland, Australia. He also presented the lecture 'Analysing Genomic Networks in Cancer' at the Australasian Genomics and Technologies Association (AMATA) Conference, Gold Coast, Australia.
- Associate Professor Thomas Proft was invited to give a plenary lecture at the 8th NZ Immunisation Conference, held in Auckland in September 2013. His lecture was titled 'The Search for a Vaccine against Group A Streptococcus'.
- Dr Tim Woodfield was a keynote speaker at the International Conference on Advanced Research in Virtual and Rapid Prototyping, held in Leiria, Portugal in October. His lecture was entitled 'New Frontiers in Musculoskeletal Regenerative Medicine: Biomaterials, Additive Manufacturing and Stem Cell Biology'.

Collaborations

The Maurice Wilkins Centre contributes to and benefits from an extensive network of national and international collaborations that have been built up by our investigators over a number of years. The research funded through the Centre has strengthened many of these existing links and helped to establish new collaborations.

The international and national reach of these collaborations is shown in the diagram below

New academic collaborations

- Melanoma Institute of Australia (Australia)
- Murdoch Children's Research Institute (Australia)
- Queensland Institute for Medical Research (Australia)
- Queensland University of Technology (Australia)
- Technical University of Sydney (Australia)
- Telethon Institute for Child Health Research (Australia)
- University of Adelaide (Australia)
- University of New South Wales (Australia)
- Federal University of Sao Paulo (Brazil)
- University of Valparaiso (Chile)
- Fujian University of Traditional Chinese Medicine (China)
- Shanghai Institute of Ceramics (China)
- Tianjin University (China)
- Technical University of Denmark (Denmark)
- Inria, Paris (France)
- Pasteur Institute (France)
- University of Bordeaux (France)
- Hannover Medical School (Germany)
- Johannes Gutenberg University (Germany)
- University of Leipzig (Germany)
- Charité Medical University Berlin (Germany)

- Indian Institute of Science (India)
- University of Padova (Italy)
- University Medical Center Utrecht (Netherlands)
- University of Oslo (Norway)
- Polytechnic Institute of Leira (Portugal)
- University of Minho (Portugal)
- Genomic Institute of Singapore (Singapore)
- National University of Singapore (Singapore)
- University of Gothenburg (Sweden)
- London School of Hygiene and Tropical Medicine (UK)
- Loughborough University (UK)
- Manchester Metropolitan University (UK)
- MRC Institute for Medical Research (UK)
- North Yorkshire and East Coast Foundation School (UK)
- Queen Mary University of London (UK)
- University of Bradford (UK)
- University of Leeds (UK)
- University of Liverpool (UK)
- University of Southampton (UK)
- University of St Andrews (UK)
- Fox Chase Cancer Centre (USA)
- Houston Methodist Research Institute (USA)
- J Craig Venter Institute (USA)
- Memorial Sloan-Kettering Cancer Centre (USA)
- Mercer University School of Medicine (USA)
- Rochester Institute of Technology (USA)
- Sanford Burnham Institute of Medical Research (USA)
- University of Arizona (USA)
- University of California (USA)
- University of Massachusetts Dartmouth (USA)
- University of Michigan (USA)
- University of Pennsylvania (USA)
- University of Pittsburgh (USA)
- Virginia Polytechnic and State University (USA)
- Weill Cornell Medical College, Cornell University (USA)

Continuing academic collaborations

North America

- University of British Columbia (Canada)
- Albert Einstein College of Medicine (USA)
- Baylor College of Medicine (USA)
- Colorado State University (USA)
- Duke University (USA)
- Global Alliance for TB Drug Development (USA)
- Harvard University (USA)
- Howard Hughes Medical Institute (USA)
- Massachusetts Institute of Technology (USA)
- Medical College of Wisconsin (USA)
- New York University (USA)
- Pennsylvania State University (USA)
- Stanford University (USA)

- Texas Medical Center (USA)
- The International TB Structural Genomics Consortium (USA)
- The Rockefeller University (USA)
- The Scripps Research Institute (USA)
- The University of Chicago (USA)
- Yeshiva University (USA)
- The University of Illinois (USA)
- University of Washington (USA)

Asia Pacific

- Burnett Institute (Australia)
- Children's Medical Research Institute (Australia)
- Peter MacCallum Cancer Centre (Australia)
- University of Sydney (Australia)
- Walter and Eliza Hall Institute (Australia)
- Australian National University (Australia)
- Monash University (Australia)
- The University of Melbourne (Australia)
- University of Queensland (Australia)
- Guangzhou Institute of Biomedicine and Health (China)
- Shanghai Institute of Materia Medica (China)
- Hong Kong University of Science and Technology (China)
- Osaka University (Japan)
- Riken Institute (Japan)

UK and Europe

- Arhus University (Denmark)
- Centre for Free-Electron Laser Science (Germany)
- The Philipp University of Marburg(Germany)
- University of Rostock (Germany)
- Julius Kühn-Institut (Germany)
- Universidad Politécnica de Madrid (Spain)
- Drugs for Neglected Diseases Initiative(Switzerland)
- Maastricht University (The Netherlands)
- Aston University (UK)
- Imperial College London (UK)
- University of Sheffield (UK)
- University of Warwick (UK)
- Nottingham University (UK)
- The John Innes Centre (UK)
- University of Manchester (UK)
- University of Oxford (UK)

Middle East

- Israel Oceanographic and Limnological Research (Israel)

Uptake of Maurice Wilkins Centre research and expertise

The primary focus of the Maurice Wilkins Centre is on finding new ways to effectively target human disease. The Centre drives the translation of its research and expertise from the laboratory through a variety of partnerships with commercial and non-profit organisations, in New Zealand and overseas.

The creation of spin-out companies is an important pathway for the development of the Centre's research, and this often brings in international partners and funds. Maurice Wilkins Centre investigators maintain close links with such companies and further work is regularly contracted back to their research groups.

The Maurice Wilkins Centre also partners with established companies, and the knowledge and expertise developed by its investigators in scientific fields vital to the biotechnology and pharmaceutical sectors are highly sought after. Examples of contract research and the provision of facilities to industry are outlined on page 19 of this report. The Centre's investigators also act as consultants for a number of national and international companies. In 2013 the expertise of Maurice Wilkins Centre investigators was sought by:

- Alder Biopharmaceuticals Inc (USA)
- AstraZeneca (UK)
- Auckland Clinical Studies Limited
- BASF (Germany)
- Bayer Animal Health Ltd
- Biomatters Ltd
- Cancer Therapeutics CRC Pty Ltd (Australia)
- Cancer Research Technology Ltd (UK)
- Canterbury Dried Foods Ltd
- Canterbury Scientific Ltd
- CoDa Therapeutics Inc (USA)
- CoDaTherapeutics Ltd (NZ)
- Comvita Ltd
- Connovation Ltd
- Dairy Goat Co-operative Ltd
- Douglas Pharmaceuticals
- Enztec Ltd
- Enzymatics Inc (USA)
- Fisher and Paykel Healthcare
- Fonterra Co-operative Group Ltd
- Gardians Ltd
- Glycosyn
- Callaghan Innovation
- Innate Therapeutics Ltd
- Integrated BioTherapeutics (USA)
- Janssen Pharmaceuticals, Inc (France, Belgium)
- Johnson & Johnson Medical (USA)
- Key Organics Ltd
- L2 Diagnostics LLC (USA)
- Landcare Research New Zealand Ltd
- Lanzatech NZ Ltd
- Merck & Co Inc (USA)

- MP Biomedicals (USA)
- Neuren Pharmaceuticals Ltd (NZ)
- New Image International (NZ)
- New Zealand Pharmaceuticals Ltd
- Novartis International AG (Switzerland)
- OBodies Ltd
- Onyx Scientific Ltd (UK)
- Ossis Ltd
- Pacific Edge Biotechnology Ltd
- Paraco Technology Ltd
- Perkin Elmer Inc (USA)
- Proacta Therapeutics Ltd (USA)
- Ruga Corp (USA)
- Sanofi Aventis LLC (USA)
- Seattle BioMed (USA)
- Seeka Kiwifruit Ltd
- Sirtex Medical Ltd (Australia)
- Syngenta (Switzerland)
- Tetralogic Pharmaceuticals (USA

The establishment of partnerships with international non-profit organisations is another way in which the Maurice Wilkins Centre achieves uptake of its research and expertise. For example, researchers associated with the Centre and based at the Auckland Bioengineering Institute are paid to work on the "Human Physiome Project", along with their European collaborators, under the European Commission Framework Programme. Maurice Wilkins Centre investigators are also involved with international organisations such as the Global Alliance for TB Drug Development and the TB Structural Genomics Consortium.

Awards and honours

International, national, and institutional honours won by Maurice Wilkins Centre investigators, affiliates, and students in 2013:

- ## Medicinal Chemistry Award

  Distinguished Professor Bill Denny has been named the recipient of the American Chemical Society's 2014 Medicinal Chemistry Award. The prestigious honour recognises outstanding achievement in the sciences that contribute to medicinal chemistry. Professor Denny is the first recipient of the award from outside the United States for more than 30 years. See page 5 for a story on this award.

- ## Science Communication Awards

  Dr Siouxsie Wiles from the University of Auckland was recognised with multiple honours for her continuing contributions to science communication in New Zealand, with the award of the Royal Society of New Zealand's Callaghan Medal for science communication and the Prime Minister's Science Media Communication Prize. The Callaghan Medal is awarded annually to a person who has, while in New Zealand, made an outstanding contribution to science communication, in particular raising public awareness of the value of science to human progress. The Prime Minister's Science Media Communication Prize is awarded to a practising scientist who is an effective communicator, to further develop their knowledge of science media communication. See page 12 for a story on these awards.

- ## Fellows of the Royal Society of New Zealand

  Professors Antony Braithwaite and Greg Cook were elected as Fellows of the Royal Society of New Zealand in 2013. "Being elected as a Fellow is an honour given to our top researchers for showing exceptional distinction in research or in the advancement of science, technology or the humanities," said Academy Chairperson Professor Geoff Austin in announcing the 2013 Fellows. Professor Cook also received the Otago School of Medical Sciences Distinguished Researcher Award in 2013.

- ## Fellow of Academy of Medical Sciences

  Professor Garth Cooper (DPhil (Oxon), MB, ChB, FRCPA, FRSNZ) from The University of Auckland and University of Manchester was been elected a Fellow of the Academy of Medical Sciences in the United Kingdom. Fellowship of the Academy is based on exceptional contributions to the medical sciences, in the form of original discovery or of sustained contributions to scholarship.

- Publishing Prizes

  Associate Professor Debbie Hay, from the University of Auckland, was awarded the 2013 Novartis Prize by the British Pharmacological Society for published work; as well as the 2013 Custom Science New Zealand Society of Biochemistry and Molecular Biology (NZSBMB) prize. The NZSBMB award is made on the basis of work published in the three preceding years.

- Derrick Rowley Award

  Professor Margaret Baird, from the University of Otago, received the Derrick Rowley Award for outstanding contribution to the Australasian Society for Immunology and to the discipline of immunology.

- Rutherford Discovery Fellowship

  Dr Jonathan Sperry, from the University of Auckland, was awarded a prestigious Rutherford Discovery Fellowship in 2013. These fellowships are designed to develop and foster future leaders in the science sector in this country.

- Emerging Researcher Award

  Dr Ghader Bashiri, from the University of Auckland, won the 2013 illumina™ Emerging Researcher Award, presented at the Queenstown Molecular Biology Meeting. The prize was developed by illumina™ and the Queenstown Molecular Biology Meeting Society to recognise and acknowledge an emerging researcher in molecular biology in New Zealand.

Financial Report 2013

Operating Fund[a]

	$ 2013	$ 2012
Income		
CoRE grant	3,867,777	4,015,450
Equipment User charges [b]	242,030	248,977
Other income[c]	34,915	27,449
Balance from previous year[d]	2,149,853	2,594,489
Total Income	**6,294,575**	**6,886,365**
Expenditure		
Salaries[e]	1,218,260	977,591
Overheads	831,232	960,223
Project costs[f]	1,480,128	1,280,491
Student support (PhD and other)[f]	613,717	722,866
Travel	156,701	208,717
Depreciation	529,416	586,624
Total Expenses	**4,829,453**	**4,736,512**
Income less expenditure[g]	**1,465,122**	**2,149,853**

Notes

a. This financial report is for the period 1st January to 31st December 2013 and covers the second six months of the Maurice Wilkins Centre Year 11 and the first six months of Maurice Wilkins Centre Year 12 (CoRE grant 2008 to 2014). This report only details income and expenditure relating to the CoRE grant funding that the Centre receives from the Tertiary Education Commission. It does not contain details of operating funding to Centre investigators from other funding agencies.

b. These equipment user charges are collected by the Centre from users of the large items of capital equipment purchased with funding from the Centre capital equipment fund. The charges are used to offset the operational and depreciation costs of the equipment.

c. This income is from UniServices and has been used to balance costs incurred by the Maurice Wilkins Centre in 2013 for salaries and working expenses associated with contract research.

d. This balance of funding is from previous years of the Maurice Wilkins Centre will be used to fund initiatives supporting the Centre's research programme from 2014 to the end date of the current funding grant from the Tertiary Education Commission.

e. The funding provided in the current grant is based on a flat line budget which does not allow for annual increases in salaries or other operating costs. To ensure that these costs are able to be met in later years of contract, the Centre's operating budget has been structured so that expenditure is less than income in the early years of this grant and the resulting credit balance is used to ensure continuity of support for the Centre's research programme in the later years of the grant.

f. Summary: Maurice Wilkins Centre supported research staff FTEs 2013

Principal Investigators	0.50
Research Fellows	7.42
Research Technicians	5.12
Total	13.04

g. These costs include the costs of subcontracts for associate investigators' research projects during 2013.

h. This balance of funding will be used to fund initiatives supporting the Maurice Wilkins Centre research programme from 2014 to the end date of the current funding grant from the Tertiary Education Commission (see note d).

Directory

Governing Board

Mr Bill Falconer (Chair)
Prof Grant Guilford
Prof Jane Harding
Prof Louise Nicholson
Ms Maxine Simmons
Prof Warren Tate

Scientific Advisory Board

Dr Jim Watson (Chair)
Prof Peter Andrews
Prof Sir Tom Blundell
Prof Suzanne Cory
Dr Jilly Evans
Prof Shankar Subramaniam
Prof Dick Wettenhall

Principal investigators

Prof Rod Dunbar (Director)	School of Biological Sciences	The University of Auckland
Prof Peter Shepherd (Deputy Director)	Department of Molecular Medicine and Pathology	The University of Auckland
Prof Ted Baker	School of Biological Sciences	The University of Auckland
Prof Margaret Brimble	School of Chemical Sciences	The University of Auckland
Prof Garth Cooper	School of Biological Sciences	The University of Auckland
Prof Bill Denny	Auckland Cancer Society Research Centre	The University of Auckland
Prof John Fraser	Dean, Faculty of Medical and Health Sciences	The University of Auckland
Prof Peter Hunter	Auckland Bioengineering Institute	The University of Auckland

Associate investigators

Dr David Ackerley	School of Biological Sciences	Victoria University of Wellington
Assoc Prof Iain Anderson	Auckland Bioengineering Institute	The University of Auckland
Prof Vic Arcus	Department of Biological Sciences	University of Waikato
Prof Paul Atkinson	School of Biological Sciences	Victoria University of Wellington
Prof Bruce Baguley	Auckland Cancer Society Research Centre	The University of Auckland
Prof Margaret Baird	Department of Pathology	University of Otago
Dr Michael Baker	Department of Public Health	University of Otago, Wellington
Mr Adam Bartlett	Department of Surgery	The University of Auckland
Dr Mike Berridge	Malaghan Institute of Medical Research	
Dr Mik Black	Department of Biochemistry	University of Otago
Dr Gib Bogle	Auckland Bioengineering Institute	The University of Auckland
Mr Michael Booth	Waitemata Specialist Centre	Waitemata District Health Board
Prof Antony Braithwaite	Department of Pathology	University of Otago

Dr Reuben Broom	Department of Medical Oncology	Auckland City Hospital
Prof Peter Browett	Department of Molecular Medicine and Pathology	The University of Auckland
Dr Christina Buchanan	Department of Molecular Medicine and Pathology	The University of Auckland
Prof Vicky Cameron	Department of Medicine	University of Otago, Christchurch
Assoc Prof Lai-Ming Ching	Auckland Cancer Society Research Centre	The University of Auckland
Prof Gregory Cook	Department of Microbiology and Immunology	University of Otago
Dr Mike Cooling	Auckland Bioengineering Institute	The University of Auckland
Assoc Prof Brent Copp	School of Chemical Sciences	The University of Auckland
Prof Jillian Cornish	Department of Medicine	The University of Auckland
Prof Kathryn Crosier	Department of Molecular Medicine and Pathology	The University of Auckland
Prof Phil Crosier	Department of Molecular Medicine and Pathology	The University of Auckland
Dr Gabriele Dachs	Department of Pathology	University of Otago Christchurch
Assoc Prof Alan Davidson	Department of Molecular Medicine and Pathology	The University of Auckland
Prof Catherine Day	Department of Biochemistry	University of Otago
Dr Renwick Dobson	School of Biological Sciences	University of Canterbury
Prof Paul Donaldson	School of Medical Sciences	The University of Auckland
Prof Rob Doughty	Department of Medicine	The University of Auckland
Dr Richard Douglas	Department of Surgery	The University of Auckland
Prof Mike Eccles	Department of Pathology	University of Otago
Dr Gary Evans	Callaghan Innovation	
Prof Antony Fairbanks	Department of Chemistry	University of Canterbury
Dr Andrew Fidler	Cawthron Institute	
Dr Jack Flanagan	Auckland Cancer Society Research Centre	The University of Auckland
Dr Richard Furneaux	Callaghan Innovation	
Prof Juliet Gerrard	School of Biological Sciences	University of Canterbury
Dr David Goldstone	School of Biological Sciences	The University of Auckland
Prof Dave Grattan	Department of Anatomy and Structural Biology	University of Otago
Prof Colin Green	Ophthalmology	The University of Auckland
Assoc Prof David Greenwood	Plant and Food Research	
Dr Chris Hall	Department of Molecular Medicine and Pathology	The University of Auckland
Assoc Prof Mark Hampton	Free Radical Research Group	University of Otago Christchurch

Dr Jacquie Harper	Malaghan Institute of Medical Research	
Dr Paul Harris	School of Chemical Sciences	The University of Auckland
Dr Joanne Harvey	School of Chemical and Physical Sciences	Victoria University of Wellington
Assoc Prof Debbie Hay	School of Biological Sciences	The University of Auckland
Assoc Prof Michael Hay	Auckland Cancer Society Research Centre	The University of Auckland
Dr Nuala Helsby	Department of Molecular Medicine and Pathology	The University of Auckland
Assoc Prof Ian Hermans	Malaghan Institute of Medical Research	
Dr Tony Hickey	School of Biological Sciences	The University of Auckland
Dr Kevin Hicks	School of Medical Sciences	University of Auckland
Prof Sarah Hook	School of Pharmacy	University of Otago
Dr Julia Horsfield	Department of Pathology	University of Otago
Prof Peter Hunter	Auckland Bioengineering Institute	The University of Auckland
Prof Geoffrey Jameson	Institute of Fundamental Sciences	Massey University
Dr Stephen Jamieson	Auckland Cancer Society Research Centre	The University of Auckland
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Dr Donia Macartney-Coxson	Environmental Science and and Research	
Dr Peter Mace	Department of Biochemistry	University of Otago

Prof John McCall	Department of Surgical Sciences	University of Otago
Dr Melanie McConnell	Malaghan Institute of Medical Research	
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Assoc Prof Mark McKeage	Department of Pharmacology	The University of Auckland
Prof Andrew Mercer	Department of Microbiology and Immunology	University of Otago
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Dr Nikki Moreland	School of Biological Sciences	The University of Auckland
Dr Kathy Mountjoy	Department of Physiology	The University of Auckland
Dr Rinki Murphy	Department of Medicine	The University of Auckland
Prof Martyn Nash	Auckland Bioengineering Institute	The University of Auckland
Assoc Prof Richard Newcomb	Plant and Food Research	
Prof Poul Nielsen	Auckland Bioengineering Institute	The University of Auckland
Dr Gillian Norris	Institute of Fundamental Sciences	Massey University
Assoc Prof Peter Northcote	School of Chemical and Physical Sciences	Victoria University of Wellington
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Dr Bjorn Oback	AgResearch	
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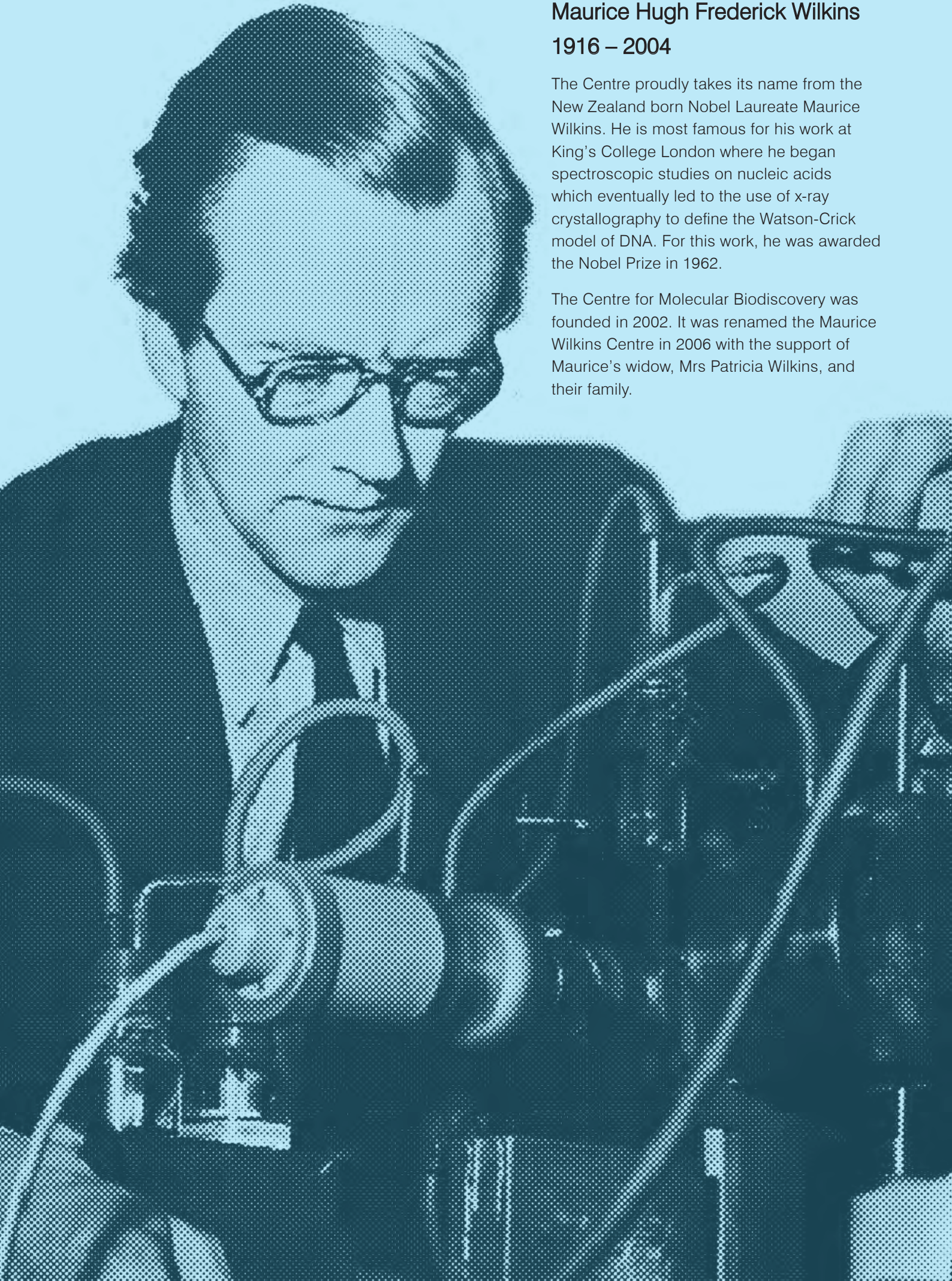

Maurice Hugh Frederick Wilkins
1916 – 2004

The Centre proudly takes its name from the New Zealand born Nobel Laureate Maurice Wilkins. He is most famous for his work at King's College London where he began spectroscopic studies on nucleic acids which eventually led to the use of x-ray crystallography to define the Watson-Crick model of DNA. For this work, he was awarded the Nobel Prize in 1962.

The Centre for Molecular Biodiscovery was founded in 2002. It was renamed the Maurice Wilkins Centre in 2006 with the support of Maurice's widow, Mrs Patricia Wilkins, and their family.