



UNIVERSITY OF CAPE TOWN

INAUGURAL LECTURES 2012





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INAUGURAL LECTURES: SPREADING THE WORD

Martin Versfeld began his 1971 inaugural lecture as Professor of Philosophy at UCT (titled *The Socratic Spirit*) by saying that an inaugural lecture is the means by which the new professor's colleagues and the public are "given a chance to sample their acquisition". If that is so, this booklet provides, so to speak, a sample of a sample: the eleven public inaugural lectures delivered at UCT in 2012 are summarised here – and if you want to know more about a particular lecture, you can hear (and in some cases also see) the full lecture on our website: www.uct.ac.za/news/lectures/inaugural/2012.

This continuing direct access to all the inaugural lectures is an exciting new development. In the past, when we did not yet have the technology that allows us to click on a YouTube video and experience the lecture as though we were present, other ways had to be found to disseminate the inaugural lecturer's thoughts as widely as possible.

Thus, since 1949, inaugural lectures have been published in the University of Cape Town Lecture Series (initially by Oxford University Press, on behalf of the Board for Extramural Studies). The first in this series was HC (Harold) Baldry's inaugural lecture, *The Classics in the Modern World*, delivered on 11 August 1949. This series lasted until 1966. In 1967 it was replaced by the New Series and in the early 2000s the university stopped publishing inaugurals – at least partially, I suspect, because the mounting pressure to publish in high-impact journals made it more attractive to rework the inaugural to conform to the norms of those journals rather than to hone it for a more general reading public.

Whatever the reason, it is a pity that we do not have a formal record of all the inaugurals delivered from 2003 to 2008. Of course many inaugurals were published individually, as they always have been, both before and during the time that the university officially published them in a series. In 2009 a decision was taken to archive the audio or video recordings of the inaugurals (which are often hard to reproduce in paper format in any event, because of the tendency to use technology to present them – although, where appropriate, there is a click-through link to the full text). To preserve the original spoken word is also important because inaugurals – like the classics, as Harold Baldry reminded us in his inaugural – are intended in the first place to be *heard*.

Often, re-reading an inaugural gives us the hindsight to see the beginnings of an important strand or strands in the inaugural lecturer's later work. Thus JM Coetzee's 1984 inaugural, *Truth in Autobiography*, was an early revelation of the importance

of the autobiographical in his writing at a time when the trilogy of *Boyhood* (1997), *Youth* (2002) and *Summertime* (2009) still lay far in the future.

John Martin's inaugural, *Engineering Education*, delivered in 1973 (70 years after the first Corporation Professor of Civil Engineering at the South African College gave his inaugural under the same title), foreshadowed the enormous influence that he was to have on both the education of engineers and research in general at UCT, while Hugh Corder gave notice of the leading role that he was to play in the development of administrative law in South Africa with his 1988 *Crowbars and Cobwebs: Executive Autocracy and the Law in South Africa*.

Inaugurals typically also reflect the special concerns of the time in which they are delivered. For example, it comes as no surprise that in the late 1980s, with the State of Emergency propelling the country towards civil war, we see a series of powerful indictments of the apartheid state; for example, Michael Savage's *The Cost of Apartheid* in 1986, and André du Toit's *Justice and Truth in South Africa?* in 1988. These concerns gave way to the building of a constitutional state in the 1990s (for example, Denise Meyerson's *Reading the Constitution through the Lens of Philosophy*) and to the AIDS epidemic as seen towards the end of the century, such as Nicoli Natrass's inaugural, *Ethics, Economics and AIDS Policy in South Africa*, in 2001.



But inaugurals should not be revisited only for the reference that they make to the life and work of the university and to the broader concerns of society, but also for their own sake. Each carefully prepared inaugural lecture represents an attempt on the part of the inaugural lecturer to delight, astonish, provoke or enlighten their audience, and often they continue to provoke these responses many years after their delivery. Some of my personal favourites in the collected UCT inaugurals are *Plants of the Sea* by WE Isaac (1950), *The Cape Vernacular* by André Hugo (1978), *When does a Settler become a Native?* by Mahmood Mamdani (1998), and *Real Presence* by Pippa Skotnes (2001).

These are but a few examples of the treasure chest of past inaugurals – and the great tradition continues. This booklet (which, since last year, has also been available the web) is intended to whet your appetite to sample more fully the offerings of our most recent new professors.

Professor Danie Visser
Deputy vice-chancellor responsible for research

DAVID BRITTON

DON'T COPY, INNOVATE, SAYS BRITTON

When it comes to innovation, Professor David Britton, founding director of the NanoSciences Innovation Centre and professor in the Department of Physics at UCT, is ahead of the game.

'Innovation' is one of those buzzwords that industry gurus and consultants like to bandy about. Professor David Britton adopted the word as a maxim; one that he's had to apply.

But then again, if you want to keep up with developments in nanotechnology, Britton explained in his inaugural lecture, *Nanoscience, Nanotechnology, and Nanovation*, delivered at UCT in October, you have very little choice but to lead, rather than just follow.

'Nanoscience', Britton stated, is the basic and applied research into nanostructured materials and nanoscale processes. (Think of structures on the atomic and molecular scale, where you need specialised microscopes to see what you're working with.) By comparison, 'nanotechnology' is the applied research and development of those nanoscale materials and nanoscale processes. And lastly, but by no means least, 'nanovation' is social and commercial innovation enabled by nanotechnology and founded on nanoscience.

Which is what Britton, past chair of the South African Nanotechnology Initiative, and his team have been doing at UCT

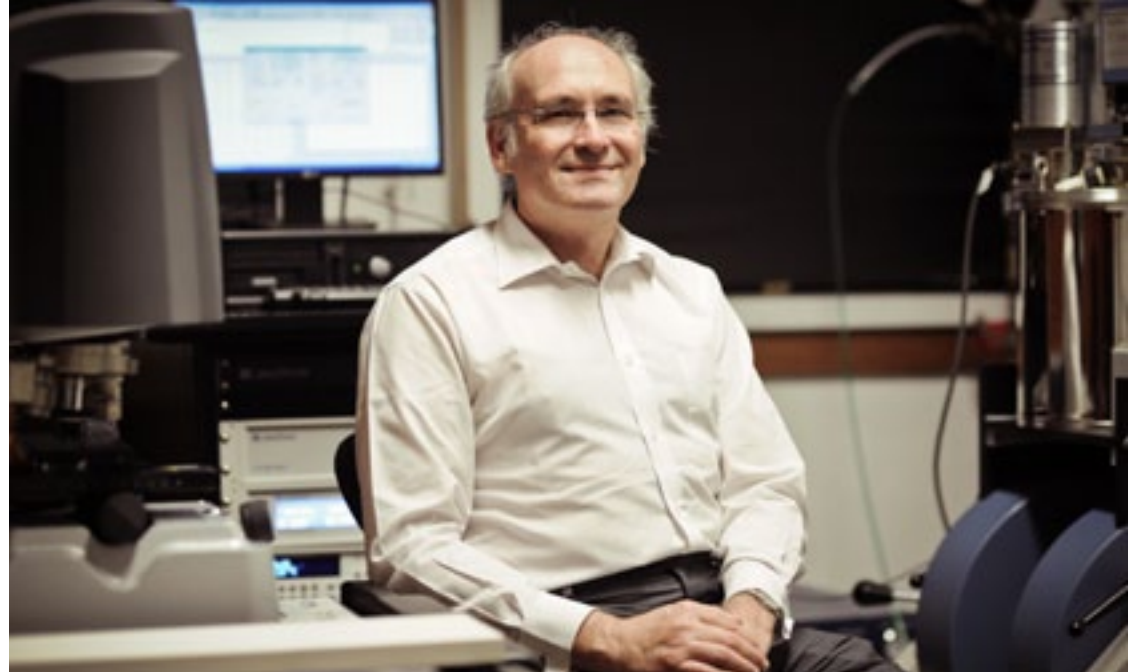
over the past 10 years. While based in the Department of Physics, the group moved from the theoretical to the realm of the applied.

Those efforts led to the formation of UCT's NanoSciences Innovation Centre in 2010. Britton is one of the centre's founding directors, alongside long-standing collaborator Professor Margit Härting.

The centre is also the principal hub of the USAID-funded Nano-Power Africa Network. This partnership spreads over four African countries, and aims to build research capacity and promote entrepreneurship through collaborative research; its ultimate objective, to be very hands-on in the development of indigenous solar-cell technology.

As a technical director of PST Sensors, a UCT spin-off company, Britton has also helmed the development of the company's first products – printed silicon temperature sensors. These can best be described as a sort of semiconductor ink, ready for use in most printing processes and crammed with electronics not visible to the human eye.

To make this kind of technology a



↑ **Staying ahead of the game: At his inaugural lecture, Prof David Britton called on scientists to keep the innovation chain when developing new products.**

reality, Britton said, they had to get the "innovation chain" just right. The first step was to make sure they were producing something that was actually wanted.

"The old story about building a better mousetrap and the world will beat a path to your door, won't work," he warned. "Most intelligent, sensible people have cats."

Inventors also – another maxim – had to 'get the basics right'.

"There is no point trying to develop something without knowing how it works, not if you're going to new territory."

And scientists need to collaborate with other role players and be innovative, Britton advised.

"One thing that is fatal when it comes to development and innovation is just copying."

This he learnt from bitter experience while working on temperature sensors, he noted.

"When we developed printed silicon transistors we had a new material, knew how it worked, but tried to copy the technology that was used for the normal thin-film silicon. It didn't work, and after a long time we had to go back to basics."

Britton and his team are now working on a range of commercial and social innovations for those printed transistors. One of the devices they are developing is a time-temperature tag for food and pharmaceutical products – to tell you whether your milk or medicines are as fresh as the use-by date tells you they are.

Britton and his team have also embarked on a project to roll out low-cost solar cells in other African countries, starting with Botswana, Ethiopia and Rwanda.

Contrary to the technology they're working with, the group is not thinking small.

JENNI CASE

CASE STUDIES LEARNING AND AGENCY

Professor Jenni Case believes learning entails so much more than simply taking down a few notes in lectures and writing the odd exam. Indeed, for her, learning in the modern world should embrace a far more holistic approach.

There is still so much to learn about student learning.

So explained Professor Jenni Case when she delivered her inaugural lecture in August, titled *Every Generation Has Its Struggle: A critical realist perspective on student learning in contemporary South Africa*. That applies to her as well, said Case, notwithstanding her 15 years in student learning and engineering education, her position as assistant dean for academic development in the Faculty of Engineering & the Built Environment, and her reputation as in-house authority on academic development in the Department of Chemical Engineering.

Not that she hasn't picked up a trick or two over the years, said Case. She has learnt, for example, that to understand the whole process of learning, she would need to embrace not just a traditional scientific approach to enquiry (Aristotle's episteme), but also an exploration of craft

(techne) and wisdom (phronesis).

Her approach has also evolved, says Case. So, for example, she has now adopted the school of critical realism as her underlying research philosophy.

For a long time researchers have been working either at the level of the actual, or – even if insightfully – only on the subjective experiences of the students. The time has come to change tack, said Case.

“If we want to start to generate insights that can help us truly understand the situation we are in, and identify what we need to do to get to a different place, we need to go to the level of the real.”

For Case that has meant sitting in on classes with her students, attending tutorials and writing tests side by side with them. In doing so, she has drawn on the work of British sociologist Margaret Archer, a doyenne of the critical realist movement. This school →

“If we want to start to generate insights that can help us truly understand the situation we are in, and identify what we need to do to get to a different place, we need to go to the level of the real.”

↓ A case for change: Prof Jenni Case spoke of how the undergraduate programme in chemical engineering will need a philosophical overhaul if success rates are to improve.



ANTHONY FIGAJI

NEW LENS ON HEAD TRAUMA IN CHILDREN

It's a pretty big jump from break dancer to eminent paediatric neurosurgeon, yet the former is precisely what Professor Anthony Figaji once wanted to be when he grew up. The world of neurosurgery should be forever grateful that he changed his mind...

The (now) first professor of paediatric neurosurgery at UCT, Anthony Figaji, once had big dreams for his future. These not only included life as a break dancer; he also seriously flirted with the idea of becoming a trapeze artist.

In his more reflective moments, Figaji used to ponder the manifold virtues of becoming a professional athlete, even a musician. But a paediatric neurosurgeon?

But the big top's loss was neurosurgery's gain, as the dean of the Faculty of Health Sciences, Professor Marian Jacobs, put it at Figaji's inaugural lecture in May.

Today – some career adjustments later – he's based in the Division of Neurosurgery, and heads paediatric neurosurgery at the Red Cross War Memorial Children's Hospital

His inaugural lecture – titled *Brain/Child. Interrupted* – marked a “long journey” that started with his childhood in Woodstock during the apartheid years.

“Being schooled at Harold Cressy High School in the turbulent 1980s

shaped my thinking,” he said. “I think I underestimated how much this affected me, and how it spilled over into my medical career. I feel very strongly that the quality of care for children should never be determined by the amount of money their parents make, or whether they were born in Cape Town or New York.”

It's a rule he's extended to public hospitals.

“Working in the state sector should never be an excuse to deliver a poorer quality of care, either. Academic institutions should be places where the boundaries can be extended; where highly specialised services not available in the private sector can be offered.”

The burden of injury in South Africa, he explained, is massive. Injury accounts for the highest burden of disease in Cape Town when measured as a cause of premature mortality, even higher than HIV/AIDS. Yet there is very little published work on head trauma, which accounts for most trauma-related death and disability in South Africa. →

of thought explores the interaction between structure (the world of material resources, positions and institutions, such as, for example, UCT) and agency (the world of human intention and action, such as the choices that students make).

Student agency has become paramount in student development, Case said.

“In the arena of student learning research, we are centrally focused on the development of student agency; we aim for students to leave higher education with different knowledge and capacity for action to that with which they entered.”

But there's a tightrope that has to be walked, she cautioned.

“Privileging considerations of agency, we focus only on students and their choice of, for example, an approach to learning,” she said. “Privileging structure are accounts which continue to search for the holy grail of the perfect teaching method.”

The reality, said Case, is that the observed student learning outcomes for the undergraduate degree in chemical engineering are no “matter of historical accident”. Almost by design, the course only graduates two-thirds of its intake, and these graduates go on to very successful careers – “the role of the undergraduate programme in students' development seems limited to learning to work hard and survive”.

...there is a need for a university programme “with a significantly enlarged space for the development of student agency”

There are a number of problems with this position, she added, not least of which that it takes the current outcomes of the programme for granted. Instead, Case argued, there is a need for a university programme “with a significantly enlarged space for the development of student agency”.

On that front, some progress has been made on the current degree programme, she said.

But only so much academic development can be done within the current programme structure, observed Case. As a result, for the past four years she and colleagues have been designing a new undergraduate curriculum, with a new first-year course scheduled to launch in 2013.

This will include a “coherent strand of project work” that will run for the duration of the degree programme, regular assessment, and ‘bootcamps’ both to help struggling students catch up in the middle of the year, and later to help them prepare for end-of-year exams.

“In this way, very ambitiously, we want to allow for students to use more of the calendar year to work towards success in the programme,” concluded Case, “and we want to significantly increase the number of students who can complete in regulation time.”

“We have been poor at treating head trauma – especially given the fact that due to our high trauma load, we should be leading the field globally.”

But producing tide-turning research will require extensive out-of-the-box thinking; thinking that cannot rely only on cookie-cutter control tests.

“With head injuries there is a huge amount of heterogeneity.”

This, he said, calls for treatment that is targeted.

How the body reacts to the primary head injury depends on its regulatory systems – which may be disrupted – and various biochemical, inflammatory and physiological consequences that then go on to injure the brain further.

This approach, he added, is also employed when treating tuberculous meningitis, a disease that progressively strangulates the brain’s vessels, and other conditions that can cause acute coma. Brain injury is an enormously complex process, and cannot be treated in simple ways.

Measuring pressure, oxygenation, cerebral blood flow and metabolism in the brain enables a better insight into what’s happening inside it; which, in turn, makes it possible to target treatment appropriately.

“We need a much more comprehensive

Measuring pressure, oxygenation, cerebral blood flow and metabolism in the brain enables a better insight into what’s happening inside it...

understanding of what happens in the brain.”

This monitoring maxim applies especially to the surgery of tumours in risky areas of the brain and spinal cord, Figaji explained. Until now, neurosurgeons have had “no indication of whether you’ve done damage until the patient wakes up”.

To counteract this, Figaji employs a method called intra-operative neurophysiological monitoring, which, in lay terms, reduces the body’s sensory and motor systems to basic electrical principles that can be monitored continuously during surgery.

The method involves attaching electrical nodes to a patient’s face and body to continuously monitor the electrical signals in the nervous system. So, should the surgeons hit a spot or move the head in a way that may potentially injure these nerve fibres, they can adjust their surgery without causing any permanent damage.

It’s no wonder that Figaji is already internationally recognised for the management of acute brain injury in children, and that his inaugural lecture marked a significant milestone in his career.

But research and titles aside, to the children Figaji treats he will be remembered mainly as the doctor who put them back together again.

↓ **Headway: Prof Anthony Figaji and his colleagues aim to take paediatric neurosurgery in South Africa to new heights.**



CLIVE GRAY

FROM HAIR-TRIGGER RESPONSE TO CO-EXISTENCE WITH HIV

Our understanding of the immune system, and vaccines for HIV, is evolving all the time. Professor Clive Gray, from the Department of Clinical Laboratory Sciences, says studying the immune events during acute infection has provided valuable insights into the course of the disease.

It's no real exaggeration to say that the immune system has almost always fascinated Professor Clive Gray. It started at around age seven, when his mother told him he had little soldiers inside his body protecting him from the 'flu.

Since then, Gray has heard a few more versions of how the immune system works, as he explained in his inaugural lecture, *Moving Targets: HIV and the immune system; in search of self-preservation*, delivered in October.

In his undergraduate studies in the UK, Gray was fascinated by the theory of Nobel Laureate Niels Jerne, who held that the immune system works as a network of antibodies creating a mirror image of the offending antigen. Gray became captivated by the central role of the major histocompatibility complex, which allows discrimination between self and non-self, or foreign.

...there is a close relationship between the virus, being a moving target for the immune system, and how the CD4 cell is a moving target for HIV.

At Wits University, where he studied for his MSc and PhD, Gray developed his understanding of immunological tolerance: a process in which the immune system fails to, or 'chooses' not to, launch an attack on an antigen. There, he worked on ways to induce immunological tolerance to kidney transplants.

It was in 1994, at the National Institute for Virology (later the National Institute for Communicable Diseases), that he first ventured into HIV research. He then spent three years at Stanford University where he examined the plasticity of immunity to HIV. He returned to the NIV and established an internationally respected HIV-immunology laboratory, where he and others explored aspects of T-cell immunity associated with viral control or disease progression.

In his lecture, Gray showed how there is a close relationship between the →

↓ New immunology: in his inaugural lecture, Prof Clive Gray spoke of new ways to look at the immune system and vaccines for HIV.



virus being a moving target for the immune system, and how the CD4 cell is a moving target for HIV. This tight interplay of moving targets is established at the point of initial infection – ground zero. By studying the immune events during acute infection, valuable insights have been gained into understanding the course of the disease.

It would appear that the patterns of CD8 T-cells targeting HIV are all-important. If these cells target portions of the virus that are conserved, then that may help slow down disease progression. However, when CD8 cells target parts of HIV that can mutate – the virus escapes the immune response. Thus, the moving viral target may not be good for the infected host.

Gray later turned to the issue of ‘self-preservation’. This, he explained, is when there is peaceful co-existence between pathogen and host.

An example is found in HIV’s primate cousin, SIV. It’s widely accepted that Sooty Mangebeys – a monkey found in forests from Senegal, east of Ghana – can live “peacefully” with the virus without disease, Gray explained. It’s also known that another monkey, the Macaque, succumbs to disease when infected with SIV.

The distinguishing feature is immune activation.

By studying the immune events during acute infection, valuable insights have been gained into understanding the course of the disease.

“It is often the case that the immune system does more harm than good when it over-responds,” Gray explained.

Thus a line could be drawn between peaceful co-existence and pathology, the “yin and yang of immunology”, he said.

“We are all focused on the yang, which is activation. We’re all looking at immune activation and how this is related to disease.”

Perhaps, he noted, it’s time to begin paying some attention to the yin. In this case, yin would be ‘tolerance’ – the ability of the host to survive and function despite infection.

In concluding his lecture, Gray asked whether a vaccine of the future should perhaps induce tolerance rather than activate anti-HIV immunity.

“This may seem counterintuitive; it may even seem heretical to say this,” he concluded.

It is this line of enquiry that Gray continues to pursue with colleagues at UCT’s Division of Immunology (in the Department of Clinical Laboratory Sciences) and the Institute of Infectious Disease and Molecular Medicine.

For this, he is focusing on new human models in order to examine immune regulation and tolerance mechanisms.

VALERIE MIZRAHI

KNOWING THE ENEMY A NECESSITY IN THE FIGHT AGAINST TB

Combating tuberculosis has become a key challenge for many involved in understanding, and eventually curing, communicable diseases. Professor Valerie Mizrahi is at the coalface of this demanding discipline.

Understanding the biology of *Mycobacterium tuberculosis* has been a lifelong and very personal obsession for Professor Valerie Mizrahi.

So, understandably, Vice-Chancellor Dr Max Price described Mizrahi’s inaugural lecture, *Knowing the Enemy: Understanding the survival and subversion strategies of Mycobacterium tuberculosis*, as a “celebration” instead of an “ascent to professorship”.

And Mizrahi did not disappoint as she spoke on *M. tuberculosis* – the bacterium that causes tuberculosis – and chronicled her 20-year journey as a TB researcher.

Mizrahi, director of UCT’s Institute of Infectious Disease and Molecular Medicine (IIDMM), shared some of

the highlights of her career; and in the process, paid homage to her students and collaborators in the fight against the dreaded disease.

Mizrahi stated that the tubercle bacillus is “the enemy by virtue of what it has done to humanity”. Worldwide there are 1.5 million TB deaths every year, while 9 million new cases are reported annually.

“A sobering way of thinking of what we are up against is that there is a death from tuberculosis every 20 seconds.”

She calculated that in the time that it took her to deliver her lecture, no fewer than 200 people worldwide would have died from the disease. And yet, drug-susceptible TB is curable. →

“A sobering way of thinking of what we are up against is that there is a death from tuberculosis every 20 seconds.”

↓ Fighting fit: The inaugural lecture of Prof Valerie Mizrahi highlighted her contribution, together with collaborators and students, to the ongoing fight against tuberculosis.

Both her parents are tuberculosis survivors. That back story, one would think, would account for Mizrahi's interest in the disease.

But there are other reasons why she has committed so many years to studying the TB bacillus. It is "just an incredibly exciting field to work in, and it is the science which has inspired me", she says.

Mizrahi, who completed a doctorate in chemistry, is interested in how the tuberculosis bacterium survives in the hostile environments it encounters in the human host, and how it builds resistance to drugs.

TB survives hostile environments because it does not react to adversity in the same way that other organisms do, she explained. Instead of succumbing to the stresses imposed by its environment, the tubercle bacillus can "turn the stress into an advantage".

Mizrahi recalled how in an experiment, former student Helena Boshoff deliberately damaged the bacterium's DNA, only for it to respond by mutating and becoming drug-resistant.

Another survival mechanism the bacterium employs, in an environment with a severe lack of oxygen, is "holding its breath. In the absence of oxygen TB can survive – but not divide – by respiring on nitrate". This, according to Mizrahi, "might underlie the great difficulty we have in killing this bacillus with drugs that target actively replicating organisms".

In closing she remarked that one of the reasons she returned to UCT, where she obtained her doctorate, was to become more directly involved in tuberculosis drug discovery.

"There is an urgent need for new TB drugs. Ten years ago there were no drugs in clinical development; now there are 10, but we must continue to fuel the pipeline for new drugs.

"In a country with one of the worst TB problems in the world, it is up to us to shoulder our responsibility to tackle it."

She ended by describing her fellow researchers in South Africa as "among the leading TB scientists in the world".

"In a country with one of the worst TB problems in the world, it is up to us to shoulder our responsibility to tackle it."



KEVIN NAIDOO

FROM THEORY TO SUPERCOMPUTER

Science has come a very long way over the past few centuries, and over the past couple of decades it has evolved in leaps and bounds. Professor Kevin Naidoo, director of UCT's Scientific Computing Research UNIT (SCRU) is a trailblazer who uses demonstrations with animated Lego blocks to give new insights into the world we live in.

In the beginning, there were the theorists.

The natural philosophers, of whom Thomas Hobbes (1588-1679) was perhaps the prime example, laid the foundation of the natural sciences, explained Professor Kevin Naidoo, director of UCT's Scientific Computing Research Unit (SCRU) and holder of a national chair in scientific computing, in his inaugural lecture in October.

In time, however, the theorists were upstaged, Naidoo continued. The likes of Robert Boyle (1627-1691), one of the pioneers of the modern scientific method, insisted that no reputable science could be conducted without experimental observation.

For centuries the back-and-forth interplay between theory and experiment – sometimes at odds with each other but codified by institutions like the Royal Society of London for Improving Natural Knowledge – would define how the sciences were practised and preached.

But, as suggested by the title of Naidoo's lecture – *The Computational Revolution and How it is Reshaping the Scientific Method in Chemistry and Chemical Biology* – changes are afoot.

Experimental observation has run into technological limits, explained Naidoo.

Using animated Lego blocks to explain how atoms move and molecules are built, he illustrated the limits of modern experimental observation. Working in a lab, scientists would not be able to create a new reaction using an enzyme as a catalyst, for example, because for now, they cannot send video cameras into the recesses of the complex enzyme to see and modify the chemical reaction. And even the best cameras around would not be able to zoom in on a molecule measuring one-billionth of a metre, or capture a chemical reaction taking place at one-millionth of one-billionth of a second.

"We don't have the tools to perform the experiments," Naidoo said. "Or do we?"

The advent of high-performance computers has allowed modern-day scientists to push the boundaries of what scientists can do, he observed.

Of particular interest to Naidoo and others at the SCRU have been the advances made in the once-overlooked field of chemical glycobiology – the study of glycans, better known as carbohydrates. It's a field that has



↑ **Change is coming: Prof Kevin Naidoo spoke, in his inaugural lecture, of the revolution brought about by high-performance scientific computing.**

caught the attention of many others as well. These carbohydrates or saccharides play a critical role in protecting viruses from attack; a sheath of protective complex carbohydrates surrounds the HI virus, for example. They also help stop tumours from being eliminated by our natural defences; there's a telling modification of the carbohydrates that sit on the surface of cancer cells, preventing the body's antibodies from attacking the tumour.

Carbohydrates also have a part to play in renewable energy, in the form of long-chained cellulose, which can be broken down and converted into a biofuel known as ethanol. ("It's the most abundant organic molecule in the biomass," said Naidoo of cellulose's importance.)

Two of the five techniques that

international agencies, like the US's National Institutes of Health and its Department of Energy, have listed as critical to advances in the glycosciences are molecular modelling and informatics, Naidoo explained.

That's because, he asserted, "critical experiments that are not possible with physical models can be performed using computational models".

"This," he concluded, "is an argument by a computational scientist – much like Boyle argued centuries ago, in the face of lots of resistance from theoreticians, that one should introduce an experiment into the scientific method – this is an argument to introduce computational simulations into the scientific method to understand nature."

Using (computerised) Lego blocks to explain how atoms move and molecules are built, he illustrated the limits of modern experimental observation.

PLAN FOR CLIMATE CHANGE

It could be said that Professor Mark New is the proverbial new man for a new world. When it comes to some of the planet's most pressing challenges, like climate change, New is mobilising experts from across the university and beyond to find lasting solutions.

When Professor Mark New was appointed pro vice-chancellor for climate change at UCT and director of the university's African Climate and Development Initiative (ACDI), he was tasked with pulling together sometimes remote – although always related – projects and scholarly interests under one umbrella. There was a lot of ground to cover, he found. Which also sums up his inaugural lecture.

New's lecture in April, titled *Squaring the Circle: Climate change, development, sustainability*, was a compilation of ongoing work at UCT (and elsewhere).

In his introduction, New noted that it's impossible to understand such a complex socio-ecological problem without understanding all its components. And, indeed, bringing them together to form a solution.

It's in this spirit of true interdisciplinarity – the core driver behind the ACDI – that New drew together a cornucopia of research, including his own, to give the audience a broad-brush outline of climate change – the what, the why, and the where-to-from-here.

It's not a pretty picture he painted.

There's no doubt that climate change is caused by humans, New said at the outset.

"We are pushing the earth system outside the conditions humans have experienced during modern human evolution."

To have a 50/50 chance of staying below a 2°C increase in global temperature, the internationally agreed target for avoiding dangerous climate change impacts, society would need to emit (from the year 1870 to 2300) no more than 1 trillion tonnes of carbon. But, said New, humans have "already used up 55% of that cake", ie 557.5 billion tonnes of carbon, and climbing.

"Essentially, two degrees is out of the window. The reality is we should be planning for coping with climate changes larger than two degrees, but at the same time pushing for emissions reductions to get us as close as possible to the two-degree target."

If the carbon emissions "business" continues as usual, temperatures are on track to reach a 4 to 7°C increase by the end of the century, he continued.

For South Africa, a 2°C increase would mean a 3 to 3.5°C rise in local warming. With this would come more and greater extreme weather events, such as storms and floods.

What does all this mean? "We will

see an exaggeration of existing climatic patterns – what's dry today, will get dryer; what's wet, will get wetter. Globally, rainfall will increase, but distribution will be very uneven."

And what does it mean for global sustainability and human development, especially in Africa?

It's about finding a balance between necessary human development and what the planet can handle, New said.

For economies such as Africa's, which are often agriculture-driven, sit very low on the human development index, and are on track for huge spikes in population numbers, change will require a re-think of future development. For one thing, by 2050 many African countries will have to bring in drought- and heat-resistant maize varieties, says New.

But the yields from these crops may be lower. So improved farming practices and more efficient food storage will have to go hand-in-hand with these new climate-resilient farming objectives to help overcome the shortfall.

Moreover, the increased demand for water will demand improvements in water-resource infrastructure. But how climate change will impact on water availability is still very uncertain.

"We need to think about putting in place plans that allow for robustness or resilience across a range of possible futures; rather than the traditional engineering approach, which is finding the optimal solution for the



↑ Prof Mark New in Kuyasa, Khayelitsha, where thousands of low-cost homes have been fitted with solar water heaters, insulated ceilings and energy-efficient lighting – the kind of initiatives that are going to be essential if South Africa is to follow a climate-compatible development pathway.

parameters you've been given."

The bottom line, New said, is that Africa has to find another development pathway if it wants to improve economic wellbeing and reduce damage to the environment. And that pathway cannot be based on the path taken by today's high-carbon emitters, but rather will have to call on green technology.

"We have the technology and the tools to do it, but the international political system is in gridlock," he cautioned.

JEAN-PAUL VAN BELLE

OPEN-SOURCE SOFTWARE THE WAY TO GO

Open-source software could become a vital factor in Africa's future development, opening up myriad opportunities, says Professor Jean-Paul van Belle of UCT's Department of Information Systems.

In UCT's Department of Information Systems, the notoriously athletic Professor Jean-Paul van Belle can regularly be spotted sporting running shorts.

But at his inaugural lecture in September, Van Belle was decked out in a suit. In a way, that was in keeping with his topic, *Penguins & Suits: Perspectives on open-source software from a discipline in flux*.

In his address, Van Belle argued that open-source software – software that is freely available, and which users can modify and distribute equally freely – should be adopted more widely by society, businesses and individuals.

He believes that open-source software has a big contribution to make in Africa and in the developing world in general, particularly in the BRICS countries (South Africa, with Brazil, China, India and Russia) which hold few software patents.

But as Mark Shuttleworth, for instance, has shown, very successful and profitable companies can be built on open-source software tools, Van Belle added.

The government, he said, spends more than R4 billion per year on software licences, with most of that money going to overseas companies. The adoption of open-source software could divert foreign-exchange flows into the country and bring much-needed macro-economic benefits.

"Because we are disadvantaged in terms of an existing body of patents, we can use open-source software to build on software without paying for royalties; thus, it is a great platform for innovation," said Van Belle. "There is a strong argument for using open-source software," he said.

A director-in-waiting for UCT's Centre for Information Technology and National Development in Africa, Van Belle has



↑ Open access: Prof Jean-Paul Van Belle said in his inaugural lecture that open-source software can improve the quality of life in the developing world.

been involved in a number of research collaborations that support his viewpoint.

In one case study, when Pinelands High School replaced its intercom system with a computer-based intracom in 2004, the school made some healthy savings. On top of that, they were able to install a PC in each classroom.

Cost-savings are a key driver for many open-source software users, particularly NGOs and small, medium and micro enterprises.

Awareness and technology immaturity

were the main barriers, Van Belle pointed out.

He added that open-source software is one example of a larger "open trend" in the world. The introduction of sources such as Wikipedia, Wikimedia and WikiBooks, as well as open-access journals and open data in academia, is a case in point.

"The dream is to have a world in which every human being can have access to information. I think we are getting there. It's a wonderful dream to have, and technology is making it possible."

"Because we are disadvantaged in terms of an existing body of patents, we can use open-source software to build on software without paying for royalties."

'HUMBLE CHAUVINISM' HELPS

Most chauvinists, it could be said, have a lot to be humble about, but 'humble chauvinism', as Professor Bernhard Weiss, of UCT's Department of Philosophy will tell you, is something else entirely, offering, as it does, a whole new 'middle way'.

"It is unwise to be too sure of one's own wisdom" is one of those useful Mahatma Gandhi-isms quickly dug up by a half-decent Google search.

But that little truth was also the premise of the inaugural lecture, delivered in May, of Professor Bernhard Weiss of the Department of Philosophy. Titled *Disagreement: Its epistemic significance*, Weiss' lecture started off, as any good philosophy talk should, with a problem.

The problem is this: a patient goes to see two doctors – Dr X and Dr Y – about a condition, and the two come to very different diagnoses. The patient clearly has no reason to prefer either doctor's verdict to the other.

But why should the doctors differ? It would seem that the only reason each doctor could have to stick with her own verdict is that it is hers. But that's "sheer chauvinism", said Weiss.

Given that, surely the rational step for each doctor is to reserve judgement on the matter. "However, the consequences of this concessive position – let's call it 'Moderation' – are surely inadmissible," proposed Weiss.

For one thing, no-one would ever

have grounds to hold an opinion in controversial areas – for example, in philosophy. "Almost every philosophical claim will be disputed by equally able and equally well-informed enquirers," he said. So, in the end, said Weiss, 'Moderation' would only lead to "a horrible and acute intellectual cramp".

On the other hand, sticking resolutely to one's own view at the expense of another's – when there is no reason to assume that that person is wrong – would not just be resolute, but "sheer bloody-mindedness".

Weiss proposed a solution, which he termed 'Humble Chauvinism'. It's a view that takes on the best of both worlds – a little moderation, and a little chauvinism.

"So we want some way to value our own views as in some sense privileged – we want to be chauvinists," Weiss explained. "But we want that to be tempered by the counter-evidence provided by opposing views – we want to be humble in our chauvinism."

This middle way, he went on, involves re-evaluating one's confidence in one's own belief. The contrary view of Dr X should not require Dr Y to give up



↑ Right or wrong: Prof Bernhard Weiss suggested that a little humility is not always a bad thing when deciding which view is correct and which is not.

her view, but at least to reappraise her confidence in its truth.

"So the suggestion is this: the evidence of others' judgements (and one's own) is not thrown into the pot of evidence and then used from a fresh perspective; rather, that evidence is used in forming a sense of one's own (and of others') reliability, which is then used in re-evaluating one's confidence in the original assessment of the original evidence."

Moreover, this way of incorporating the evidence of others' judgements is motivated as appropriate when one is an engaged enquirer rather than a mere information-seeker, said Weiss.

Finally, he used his concept of 'Humble

Chauvinism' to reflect on academic enquiry. Typically, academics are accorded some freedom of enquiry, but only in a "context of academic structures which institute elaborate systems of authority".

As engaged enquirers, Weiss proposed, academics should be "immune to a certain kind of deference embodied in 'Moderate' epistemology".

On the other hand, he said, as part of the enterprise of enquiry they will be involved in the business of appraising the reliability of enquirers. When institutionalised, this would require exercising an authority over their disciplines, and in the process, assuming a role as custodians of an intellectual heritage.

...sticking resolutely to one's own view at the expense of another's – when there is no reason to assume that that person is wrong – would not just be resolute, but "sheer bloody-mindedness".

CAROLYN WILLIAMSON

HIV'S COCKTAIL OF CHALLENGES

As medical science moves closer and closer to a cure for AIDS, the subject of HIV is by no means boring or 'yesterday's news'. Indeed, says Professor Carolyn Williamson, head of the Division of Medical Virology at UCT's Institute of Infectious Diseases and Molecular Medicine, despite talk of 'HIV fatigue', the disease remains one of the most compelling issues of our time.

There's talk of 'HIV fatigue', of a public grown tired of statistics and stories and politics around the disease.

But as Professor Carolyn Williamson, head of the Division of Medical Virology in UCT's Institute for Infectious Disease and Molecular Medicine, and of the National Health Laboratory Service, illustrated in her inaugural lecture in May, HIV can still make for gripping listening.

In her lecture, *HIV: Surviving under immense pressure*, Williamson took the audience on a journey through what she termed "the greatest viral epidemic of the current time".

Firstly, she tracked the origins and the spread of the virus in South Africa. She also spoke of the "pressures" she and her team of researchers have encountered in

their 20 years of research into HIV.

These included political worries, such as when former President Thabo Mbeki's government appointed a panel to seek "other solutions". This while the rest of the world was celebrating the discovery of new drugs that could treat HIV, and evidence was surfacing that mother-to-child transmissions could be either curbed or prevented through the use of those drugs.

Williamson was part of that presidential panel, and described the time as "one of the darkest periods of recent South African history".

"It was a bizarre experience," she recalled. "It was like living in an alternative universe, and one that had extreme repercussions for the country."

Williamson was part of that presidential panel, and described the time as "one of the darkest periods of recent South African history".

↓ Epic story: The fight against HIV has taken many twists and turns, said Prof Carolyn Williamson.



MARTIN WITTENBERG

ROADMAP NEEDED FOR PROMISED LAND

Just how serious is poverty in South Africa, and what strides have we made as a nation to root out inequality? These are questions posed by Professor Martin Wittenberg, director of DataFirst at UCT's School of Economics.

She reported that it was subsequently estimated that nearly one-third of a million people died as a result of delays in rolling out anti-retroviral therapy.

There were pressures in the laboratory, too, as scientists struggled to find a vaccine that everybody seemed to be expecting imminently. Williamson described finding a solution to HIV as her "true passion in life", particularly her attempts to understand the progression from infection to full-blown disease, and using this work to help develop an effective vaccine against the virus.

Questions arose, about whether that progression was the same in HIV-positive people in Africa as it was among those in Europe; about how people control the virus; and about why people progress at different rates.

The findings were complicated, she said. For instance, a study in KwaZulu-Natal by the Centre for the AIDS Programme of Research in South Africa found that roughly 25% of HIV-positive people would need therapy within a year of their infection, based on current guidelines. About 14% of the others – so-called 'HIV controllers' – were able to control their

virus to low levels, thus extending their life expectancy.

The individual's genes and immune system are important to the control of HIV, said Williamson.

"If the virus escapes from the immune system, it's bad news; but if it escapes in a region that affects viral fitness, or you have a good immune response which prevents it from escaping, then the person is better off."

But despite the many advances, there is still a vast amount to be learnt about HIV and AIDS, said Williamson.

"The truth is, despite 20 years of intense research, we don't understand all the reasons why people are slow or fast progressors. That is an area for further study."

To Williamson's mind, vaccines are the best weapon to control HIV, she said in closing.

One candidate vaccine, the locally-developed DNA/MVA vaccine, made up of a prime vaccine followed by a booster vaccine, is currently on trials both in South Africa and in the US.

Expect some more gripping reading ahead.

"The truth is, despite 20 years of intense research, we don't understand all the reasons why people are slow or fast progressors."

Professor Martin Wittenberg's business may be data, but it's not of the dry kind.

Quite the contrary, as Wittenberg illustrated in his inaugural lecture, *Economics and Transformation: Measurement, models, maths and myths*, delivered in August, and as colleague and "inspiration", Emeritus Professor Francis Wilson, testified immediately after. Instead, Wittenberg, director of UCT's DataFirst, a unit devoted to survey research in Africa, has seen the coalface plenty of times.

Take the point – August 1987 – at which he started his lecture. A young leader in the United Democratic Front, Wittenberg is on the run from the security police. At the same time, fascinated by the "dysfunctional" apartheid state, he is trying to work on a master's degree in local governance at what was then the University of Natal.

In Pietermaritzburg, for example, a mishmash of government types operate concurrently, and often in competition. Access to services is determined by the administrative structures in place in the particular area, and also, in black communities, by whether the local authorities are headmen and chiefs or perhaps landlords. The state and police also try and set up their own strongholds in these areas, recruiting locals who have something to gain from the existing structures.

Out of this "mess", said Wittenberg, would arise the protests that would finally help to topple the apartheid state. So forget any notions of a functioning, modern state being in place, he added.

"There were bits of it that were functioning ... but the system as a →

"...the task in 1994 was not to transform an existing, functioning state, but to create a new state out of all these bits and pieces that were there to begin with."

whole was a complete and utter mess. So the task in 1994 was not to transform an existing, functioning state, but to create a new state out of all these bits and pieces that were there to begin with.”

Wittenberg then took a detour, in 1993, by way of the Projects for Statistics on Living Standards and Development, a household survey collected under the direction of Wilson and UCT’s Southern Africa Labour and Development Research Unit (SALDRU). That study merely confirmed what everyone already knew: that South Africa was a very unequal state.

By 2008, the picture hadn’t changed much, according to the first wave of the National Income Dynamics Survey, or NIDS, again conducted by SALDRU.

“And if you’re used to thinking in terms of Gini coefficients [which measure income disparity], in some senses the 2008 picture may even be slightly more unequal than the 1993 picture,” said Wittenberg.

These surveys show that despite social grants making some inroads, South Africa is a society characterised by persistent poverty, high levels of unemployment and continuing inequality. Anomalies in the surveys – showing, for example, an increase in unemployment over the post-apartheid era – create a problem for those who analyse survey data. So the likes of DataFirst and Statistics South Africa have been accused of exaggerating

unemployment and poverty numbers.

(Instead, the numbers and service-delivery protests would suggest that the country is once again sitting on a powder keg similar to that of Pietermaritzburg in the 1980s, cautioned Wittenberg.)

There are many possible explanations for the persisting pattern of inequality in South Africa, he explained. These range from inequality traps (a big unskilled group is unable to transform into a smaller skilled and well-compensated group) to a new elite that is loathe to change institutions, such as government, that allow them to feather their own nests.

Wittenberg then turned to the inaugural lecture delivered by his father in August 1987, in which the latter, an Old Testament scholar, explained how even the kingdom of Solomon and his giant temples and fortifications were built on slave labour and inequalities. And while there were those who sang the praises of wise Solomon, Wittenberg senior had recounted, there was also resistance.

So, too, resistance may come in South Africa, noted Wittenberg.

“Today, we are not in a state of bondage, but we are certainly not yet in the Promised Land.”

It is now for the country’s academics to decide, he added, if they are praise singers (whether of the status quo or for a free market), or whether they will “critically reflect” and challenge those in power to change how they govern.

↓ Balance of power: In his inaugural lecture, Prof Martin Wittenberg tracked the state of South African poverty and inequality via a number of surveys.





What is an inaugural lecture?

Inaugural lectures are a central part of the University of Cape Town's academic life, celebrating an important milestone in an academic career: the inaugural lecturer's appointment to full professorship.

These lectures also provide an important platform for the academic to present his or her body of research, much of which is funded by government, industry and other benefactors.

The lectures also provide UCT with the opportunity to showcase its academics and share its research with members of the wider university community and the general public in an accessible way, demonstrating the benefits of the research to broader society.

www.uct.ac.za/news/lectures/inaugural/2012/



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Publication design: *the earth is round*
karien@theearthisround.co.za

