impact

APRIL 2004








UNIVERSITY OF CAPE TOWN

A REPORT ON RESEARCH AND OUTREACH AT THE UNIVERSITY OF CAPE TOWN

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175 years on... changing minds and histories

UNIVERSITY OF CAPE TOWN

Foreword

As a research-led institution, the University of Cape Town has set itself the twin objectives of excellence and relevance.

While we strive to be a global player, with a special focus on Africa, we are also aware of the responsibility we have to serve the most pressing needs of our diverse society which is but 10 years into its new democracy.

This landmark for South Africa coincides with UCT's 175th anniversary, an appropriate time for us to reflect on our past, and envision and plan the future.

Impact is a reflection of these objectives.

At this institution, enormous care is being taken to grapple with the most pressing issues of the day, be these in the fight against pandemic diseases such as HIV/AIDS and malaria, or the needs of the poor.

Many of the areas of research we are engaged in on the scientific and technological level are of practical application, such as the development of new, cost-effective chemical processes for industry. At UCT, our mix of academic enterprises also throws up unique solutions, and we are encouraged to see how these ideas cut across the disciplines. Consider how engineers are putting their heads together to solve the problems of managing the delivery of anti-retrovirals to the general population using cellular and computer technology.

And while our relevance is critical to us, we know that the intellectual enterprise cannot be about the material world alone. It is in this spirit that we decided to include news on Associate Professor Pumla Gobodo-Madikizela's highly acclaimed book *A Human Being Died That Night: A South African Story of Forgiveness*, in which she chronicles her interviews with Eugene de Kock, the former commander of the infamous Vlakplaas hit squads.

The energy and range of work reflected in this publication is an indication of our standing as a research institution.

UCT is proud to have the highest proportion of rated leading scientists in South Africa while our research publications generate the highest number of citations, a measure of scientific impact. In addition, UCT is a major beneficiary of THRIP (Technology and Human Resources for Industry Programme), the South African government's flagship to promote partnerships between industry and research.

We have also set ourselves the challenge of developing the next cadre of high-level researchers by implementing a major research capacity-building initiative, and we are giving attention to our postgraduate profile, recognising the important role these students play in our research endeavours.

This publication brings you but a small taste of the rich mix of activity at UCT. We believe this indicates that UCT not only sets many of the standards, but also that high quality research can have a meaningful impact on lives.

Professor Njabulo S. Ndebele
Vice-Chancellor

Noakes and co. blow old dictums out of the water

Drink, drink and then drink some more has been an article of faith for endurance athletes for much of the last three decades since the boom in marathons in the mid-1970s.

Now, after 18 years of dissent and dispute on the subject, Professor Tim Noakes and his trusty band of researchers at the Sports Science Institute of South Africa (SSISA) have won over the minds and hearts of the American sports science fraternity with their dissenting take on the issue.

At the heart of the inter-continental polemic lay the issue of how much athletes participating in endurance events should be drinking. For some time now scientists at the SSISA have been arguing that runners quaff down way too much H_2O and sports drinks during races, with sometimes fatal consequences.

On the flip side, their US counterparts (along with some big-name sports drink producers) have been urging athletes to drink as much as possible, citing the need to counter fluid loss caused by sweating.

But according to Noakes and local scientists, this fluid binge leads to a condition known as hyponatraemia, where too many liquids dilute the body's necessary salts and athletes end up with low sodium levels. Hyponatraemia can cause anything from confusion and disorientation to seizures or even, as has happened in the US, death.

While Noakes and his team pressed athletes to cut down on their liquids - South African and a handful of American coaches and marathon organisers had heeded the call - most of their US counterparts continued to push for greater fluid intake.

But in April 2003, USA Track & Field (USATF), the governing body for track and field, long-distance running and race walking events in the US, announced radical changes in its hydration guidelines. The documents listed on the organisation's website - www.usatf.org (see Hydration Guidelines under its list of Featured Items) – now include a 2002 advisory statement (an article that had actually gone missing for a while) by Noakes and Professor David Martin of Georgia State University.

According to Noakes, the new guidelines represented a sea

Prof Tim Noakes

Noakes continued

change in policy, especially compared to those touted by the American College of Sports Medicine (ACSM). Whereas the old guidelines called for athletes to imbibe more than a litre of fluid an hour (or as much as they could tolerate) and advised them to drink before they became thirsty, the new ones proposed that they start out well hydrated and then only drink when they actually feel thirsty during the race.

These guidelines were applied for the first time at the 2003 Boston Marathon (run on April 21), a race that had been plagued by hyponatraemia in the past. The death at the previous year's event of a 28-year-old woman who had gorged herself on sports drinks during the race may, in fact, have sounded the knell for American resistance to local findings, Noakes says.

Tracing the history of the phenomenon, Noakes points out that marathon runners during the early 1900s, for example, almost to the man eschewed water and foods. Instead, the hardy fellows turned to chewing gum, alcohol or cocaine (then still considered a harmless performance enhancer), among other oddball restoratives, to keep them going.

Up to the 1960s, most runners still shunned fluids during races, but did extremely well, Noakes says. As marathons mushroomed in the mid-1970s - fuelled by the swell of recreational runners signing up for such events - guidelines almost exclusively called for an increase in fluid consumption.

This message would become canon over the next couple of decades.

The World Marathon Guide of the early 1990s, for example, advised participants to "drink big", and observed that "dehydration is one of the most common causes of premature fatigue".

"These guidelines were based on the theory that any dehydration that you develop during exercise is detrimental to your health and performance," says Noakes. "But you then have to ask yourself, how were people able to run without drinking - and break world records - in the past?"

Commerce, mostly in the form of sports drink producers, also cajoled runners to drink more, he notes.

In South Africa, too, runners (including, initially, Noakes) were baying for more water points during races. Not too surprising then that the country's first case of hyponatraemia cropped up at the 1981 Comrades Marathon, the year organisers capitulated to these demands.

By 1991, Dr Tony Irving, who had completed his PhD on hyponatraemia and its associate drop in sodium levels at UCT, had provided "absolute" proof that this seminal case and the subsequent cases of hyponatraemia were a result of "water intoxication".

Further research and articles - and a handful of rejection slips from American journals - still did not convince the ACSM, however. "It might as well have been published in Chinese for all the attention it received," said Noakes of Irving's definitive 1991 article that did manage to get into print in the US.

About 250 reported non-fatal cases and eight fatal cases between 1985 and 2002 in the US and elsewhere did little to change attitudes, says Noakes. But the death - entirely preventable, according to one medic - in the 2002 Boston Marathon may have struck the final blow to American resistance, not least because organisers feared that future deaths would incite litigation.

For Noakes and his colleagues at UCT, the USATF announcement came as some long-awaited vindication. So much so that *Discover Magazine* in New York named the chronicle as one of its 100 top science stories for 2003, rating it among articles on SARS, stem cell research, mad cow disease and the use of Agent Orange in Vietnam.

If good science is about asking the right questions, said SSISA co-founder Dr Morné du Plessis of the work, then "brave science is about asking questions that others are afraid to ask".

Facing off with Prime Evil

Imagine being a black South African sitting across from a man who, more than most, stands as avatar of the evils and atrocities committed in the name of apartheid.

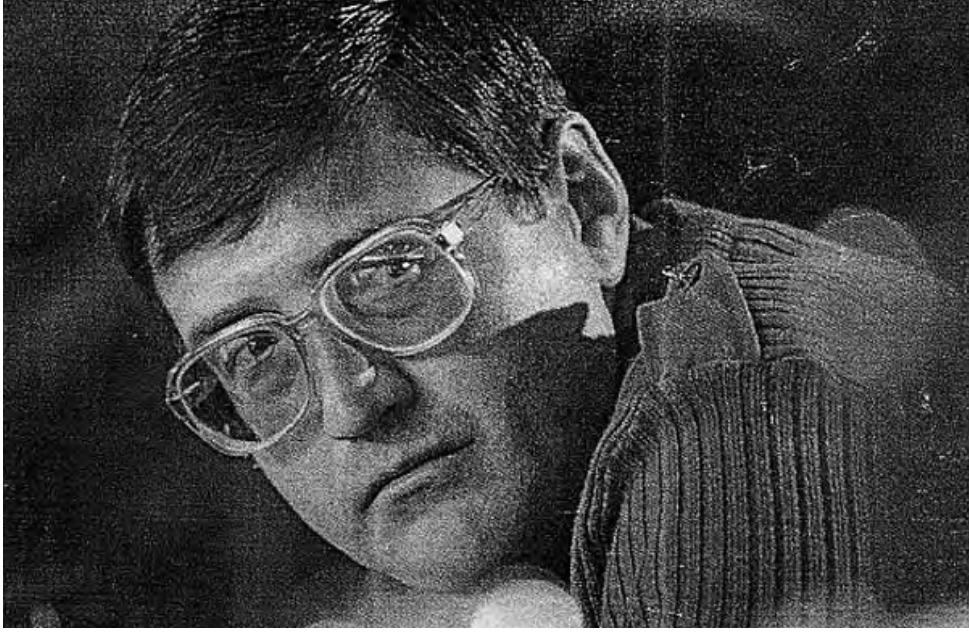
Someone who only years ago - without pause or scruple - would have killed you simply because you opposed a loathsome political system and/or because he was told to do so.

Then imagine finding the human behind this monster. And forgiving both.

Confronting evil and understanding its human face is the struggle that lies at the heart of *A Human Being Died That Night: A South African Story of Forgiveness*. In this tour de force, released to unanimous acclaim in the US early in 2003 [and to equally rave reviews in South Africa and the Netherlands, where it was released later in the year], UCT's Associate Professor Pumla Gobodo-Madikizela chronicled her interviews with Eugene de Kock, the former commander of

Assoc Prof Pumla Gobodo-Madikizela

Prime Evil continued



the infamous apartheid hit squads that operated from Vlakplaas on the outskirts of Pretoria.

Their huddles at C-Max, the maximum security section of Pretoria's central prison, sprang from Gobodo-Madikizela's two-year stint with the Truth and Reconciliation Committee (TRC) in the late 1990s.

As a member of the TRC's Human Rights Violations Committee in Cape Town, she had spent much of her time giving support to victims of human rights abuses and steering the public hearings processes in the Western Cape. She also interviewed family members of both victims and perpetrators of apartheid crimes.

It was as part of her trysts with perpetrators that Gobodo-Madikizela would meet De Kock. Over a three-month period she would spend some 46 hours in conversation with the man known to South Africans as "Prime Evil", he – as whenever he receives visitors – chained to a metal stool that is bolted to the floor.

Her series of interviews with him – and the ubiquitous use of the word evil – serves as the axis around which *A Human Being Died that Night* revolves.

"I used 'evil' deliberately," says Gobodo-Madikizela, "because I want to confront the reader with my struggle in the book, a struggle that raises questions about our notions of evil."

As a religious concept, evil is often viewed by people as something "outside" themselves, she notes. Those who commit atrocities are seen as being "inhuman".

"What I do in the book is challenge the reader to confront the human face of evil. Evil is a part of who we are and exists, potentially, in everyone."

Her encounters with De Kock reaffirmed her belief that those seen as evil are, in fact, very human.

"These deeds that we call evil, such as the atrocities committed by people such as Eugene de Kock, are deeds that emerge out of society, as well as the result of the tacit support by society itself."

It is in addressing such issues that the TRC has helped both the victims and perpetrators come to terms with their past, comments Gobodo-Madikizela. While perpetrators attain a sense of redemption out of the dialogue, for victims these exchanges provide a sense of power – the power to forgive.

"When a perpetrator acknowledges wrongdoing and asks for forgiveness, they are in a sense giving back control to the victims," says Gobodo-Madikizela. "And they, the victims, regain a sense of power – the power to either grant or not to grant this forgiveness."

A Human Being Died that Night made something of a splash in the US, where it was launched over a six-week, 12-city promotional tour. The book also drew plaudits from a number of local political and literary VIPs, including Archbishop Emeritus Desmond Tutu and UCT's Emeritus Professor JM Coetzee, as well as such prestigious publications as the *New York Times* and *Time*.

The US *Christian Science Monitor* named it a "notable book of the year", while the *Sunday Times* and *The Star* both voted it as Book of the Week after its release here in South Africa.

Gobodo-Madikizela, noted *Time*, had "composed a beautiful moral document that is without a whisper of easy grace".

Conserving La Réunion's indigenous flora

Across the broad expanse of the Indian Ocean, skipping the bulk of Madagascar, is the volcanic isle of La Réunion – rugged and isolated and one of the world's 25 biodiversity hotspots. But until recently it was an island without a conservation plan, a target for urban encroachment and invasive plant species. But that was before UCT researchers teamed up with counterparts from La Réunion University.

The island's authorities had also been under considerable pressure by the French government (La Réunion is one of 14 French regions) to identify suitable areas for national parks and other protected areas.

This resulted in an unusual collaboration between UCT and French researchers via an agreement co-financed by South Africa's National Research Foundation (NRF) and the French Ministry of Foreign Affairs, working with the University of La Réunion. Their brief? To devise a plan to conserve the island's special biota with its rich variety of endemic plant and animal species.

Assoc Prof Dave Richardson (left) and postdoctoral fellow Mathieu Rouget

La Réunion continued

Two UCT researchers, Associate Professor Dave Richardson and post-doctoral fellow Mathieu Rouget, were pulled in to tackle the task.

The duo used an approach for conservation planning developed by UCT's Institute for Plant Conservation for the Cape Floristic Region. The plan identifies broad habitat units as biodiversity entities for systematic conservation planning.

The study is the first spatially explicit assessment of habitat diversity and transformation in La Réunion.

"Sophisticated techniques were needed to assess the status of protection of the island's unique habitats," said Richardson, who is also deputy director of the UCT institute.

Rouget, fortuitously, graduated from the University of La Réunion and his mother-tongue skills and knowledge of the island have been especially valuable to the project.

Richardson and Rouget have also worked closely with ecologist Dominique Strasberg, deputy dean of research at Réunion University's science faculty.

Lying on the submarine Mascarene Plateau, La Réunion is one of three islands that make up the Mascarene Islands, east of Madagascar. (The others are Rodrigues and Mauritius.) The islands were apparently known to Arab traders but were officially discovered by the Portuguese at the beginning of the sixth century. They were named after Pedros Mascarentas, who visited these pinpricks of land in the vast Indian Ocean in 1512.

Unlike Mauritius, La Réunion is a volcanic island dominated by two large peaks, one of which is Piton de la Fournaise, one of the world's most active volcanoes. It is home to an eclectic mix of people, including Indians, Chinese and French-speaking Europeans.

These islands are unique, isolated and thus teeming with endemic species. But the effects of hunting, species introductions, deforestation, farming and urbanisation have dramatically eroded the habitats and caused the extinction of species. Many surviving endemic Mascarene species are seriously threatened.

For example, a reported 30 out of 45 native terrestrial vertebrates have become extinct since European occupation of the island.

The flora, originally comprising 500 native species, is now dominated by 2 000 introduced species of which about 628 are naturalised and 62 highly invasive.

"La Réunion is by far the most intact habitat of the three Mascarene Islands, but its natural habitats are under siege from urbanisation, agriculture and alien plant invasions," Richardson explained. And although La Réunion has no formal conservation areas, it has by far the largest area of relatively intact habitat of the Mascarene islands. This is largely due to its rugged topography, which has precluded agriculture and other forms of land use in some habitats.

"But the opportunities for preserving tracts of Mascarene ecosystems on La Réunion are very good," Richardson added. Most importantly, with a proper network of conserved areas, La Réunion could also serve as a benchmark for restoration of habitats on other south western Indian Ocean Islands, he said.

Richardson and Rouget began their work with mandatory consultations in the capital of Saint Denis, where they hosted a number of workshops and meetings with interested and affected parties.

But they faced a number of hurdles. Details and maps of the islands were sparse. Their first task was to produce a map of the island dividing it into manageable habitats. As little information was available on the island's former natural state, they revisited important vegetation studies, including the 1970s findings of Frenchman Theresien Cadet, who had produced an island-wide description of vegetation types.

With a broad idea of the vegetation types the island supported, they used data on altitude, soil types, rainfall and climate and their association with vegetation types to reconstruct the original (pre-transformation) extent of natural habitats.

This information was entered into a Geographical Information System and enabled the researchers to map coarse-filter biodiversity surrogates and to identify areas where the habitat had been transformed over the years.

"We proposed a protocol for defining a system of habitats and for using these to provide a preliminary assessment of conservation priorities for La Réunion," Richardson elaborated. "The protocol draws on existing data and expert knowledge to map habitat types, assesses the extent of habitat transformation, and quantifies heterogeneity between habitat types.

"Importantly, this approach can be duplicated for conservation plans on the other two Mascarene Islands, where similar levels of information are available."

In their studies, the researchers found that the island's pattern of habitat transformation was uneven among the 19 habitat types identified. "While three habitats have lost 95% of their original area, four still have 80% of their original extent," Richardson said.

La Réunion is also the last of the Mascarene Islands with large areas of untransformed forest; and these thus represent regional conservation priorities. And although the island's habitats are under threat from tourism and urban development, Richardson and Rouget are confident that La Réunion has the opportunity to preserve a representative sample of all habitat types. Maps from their broad-scale analysis of habitat diversity are already in use by local stakeholders in land management and conservation.

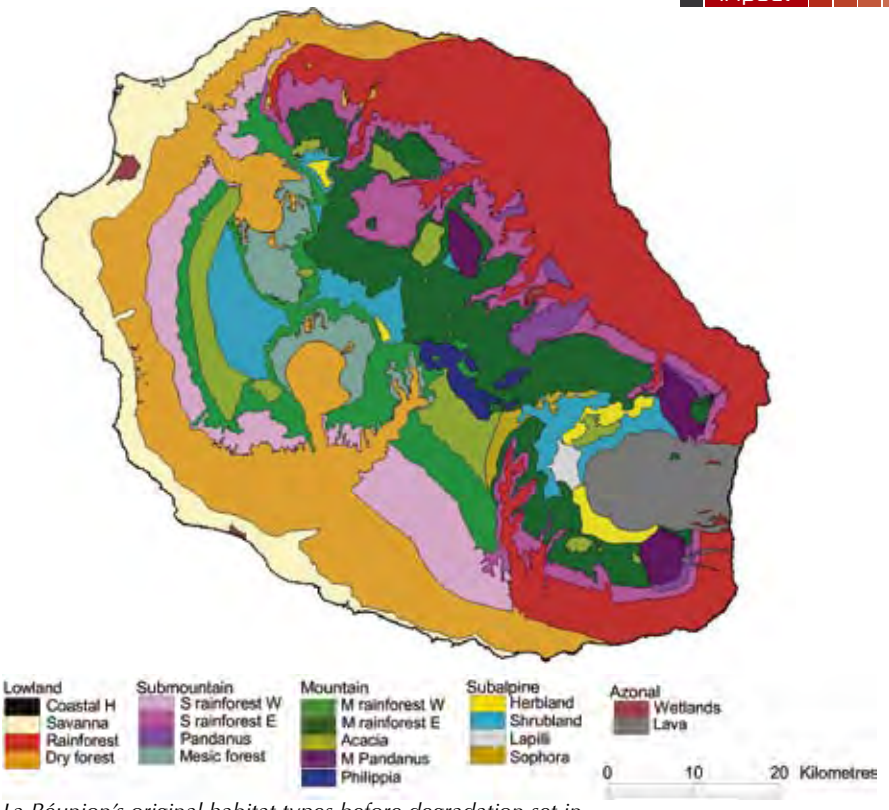
"The project has paved the way for more detailed conservation planning and hopefully the creation of formal networks of reserves and other conservation initiatives," Richardson added.

Local decision makers are also currently implementing a national park project with the support of the French Ministère de l'Environnement.

"In the old days it was thought to be sufficient to keep a certain percentage of land for reserves. It's now evident that we need to conserve representative parts of all habitats, with an emphasis on connectedness," Richardson said.

"It's been very encouraging to see that the work we have done has been so well accepted."

But the relationship goes beyond conservation planning and back to conservation research and education. Benis Egoh, a postgraduate researcher at UCT, is currently working on La Réunion, Dr Stephane Baret from La Réunion is doing a postdoctorate at UCT, and funds are in place for further exchanges of students between UCT and La Réunion to refine aspects of the initial plan. Special emphasis will also be given to improving the understanding of the dynamics of alien plant invasions.



La Réunion's original habitat types before degradation set in.

Exclusion in South African schools

In a study spearheaded by UCT's Professor Crain Soudien and Dr Yusuf Sayed of the University of Sussex in the United Kingdom, researchers have taken a closer look at the state of racial affairs and integration in South African schools.

Integration in South African schools remains, strict policies and stern words from the minister of education notwithstanding, a national bugbear.

Just when all appears quiet on the school front and it seems learners and teachers are getting along, a racial row breaks out of the classroom onto the front pages of national newspapers. In the 1999 cause célèbre, for example, a black student from the tinderbox Vryburg High in the North West Province stabbed a white pupil from the same school.

And in 2003, television cameras dogged a white schoolgirl and her mother and boyfriend who had allegedly been involved in a fracas with a black learner at Edgemead High in the Western Cape.

What is going on at South African schools, many ask? Is there a Vryburg or Edgemead around every corner?

Tracking 14 schools in the Western Cape, the Eastern Cape and KwaZulu-Natal, many of which had catered exclusively for different race groups in the past, researchers looked at the schools' micro practices, paying close attention to admission, language and classroom policies as well as fee structures.

Interviews were conducted with principals, teachers, learners and members of the community, and researchers sat in on classes.

"The theory that was used in the project was based on a novel understanding of inclusion and exclusion," the group said in their report. "While inclusion and exclusion have come to be understood as referring to people with physical and mental disabilities, the terms were used in the project to encompass all forms of difference."

Crucial to the study was the argument that inclusion and exclusion were mutually dependent terms, researchers noted.

"Inclusion was often premised on a set of ideas that privileged particular

Prof Crain Soudien

Schools continued

social qualities or attributes at the expense of others. As a consequence, programmes or plans that set out to include based on, say race, would end up often excluding others based on class or gender."

Researchers came up with some troubling findings.

Although not one of the schools overtly discriminated against children, parents or teachers on the basis of race, class or gender, "in practice all of these factors were in use, sometimes covertly and sometimes deliberately", the study indicated.

"Illegal as it is, schools were forcing young people to write entrance tests, to sit for language competency tests, consistently pushed up their fees to maintain what they thought were 'good' standards, and were presenting themselves as bastions of one or other culture."

As inclusive as schools proclaimed to be, most were practising at least one form of exclusion, researchers claimed. And so as "open" as many schools had formally become, in practice they continued to be places where the poor and non-English mother-tongue speakers struggled to gain access and even to hold onto the access they had.

"Although a new inclusive education dispensation is set out on paper, and although schools have an understanding of what is expected of them, they are to a large extent hostages to their pasts," the group reported. "The study showed how often policy intentions are thwarted, misinterpreted, ignored or skewed in individual schools."

Language, in particular, was mobilised to mediate race and class interests, the researchers observed, and African languages and indigenous knowledge systems were being marginalised.

In addition, school governing bodies were not functioning in a democratic and inclusive way, but often entrenched the power of school principals with minimal community participation.

"However," added researchers, "the study also showed that schools and teachers had little or no official departmental support when dealing with the complexities of change that they face."

Teachers, the study found, hold sway when it comes to making learners feel welcomed and included in schools. And learners were quick to pick up on unfair treatment.

"On the positive side, some teachers are making efforts to link their schools to the wider communities in which they are located, and not only to their older and traditional feeder communities."

On the down side, the study noted that many teachers struggled to deal with their learners in an equitable way. Often this had to do with the fact that the teachers came from the same group as those learners who were "being privileged", said researchers.

In one school, for example, a teacher was interacting more with his Indian learners than with his African charges, and the African learners understandably took exception to being shunned. According to the teacher, he was paying more attention to the Indian learners because OBE [Outcome Based Education] "disadvantaged" them and he felt he had to compensate for this.

He argued that the OBE classes "advantaged" African learners who were not shy to express themselves, which in turn intimidated the Indian learners.

In aiming to include the Indian learners, the teacher excluded the African learners.

Exclusionary practices are thus still widespread in South African schools, the research team concluded.

"Perhaps one step towards addressing exclusion entails detailed study into what schools are doing, and why, in order to create policies and investigate ways that help us to move towards a more inclusionary and just experience for our schools' learners," they added.

That most schools participating in the project refused to take part in feedback sessions does, however, not bode well for the future.

Fellow joins President's posse

2003 will stand out as a watershed year for the law faculty's Associate Professor Anton Fagan. On the heels of the Humboldt Research Fellowship he won to conduct research in Germany during 2003/4, came news of a National Research Foundation (NRF) President's Award, or P-rating.

He was the first candidate from the faculty to collect an NRF rating. (In 2002 researchers in law and the humanities were invited to apply for evaluation and rating for the first time.)

One could have expected great things of the UCT alumnus (LLB (magna cum laude) 1988) who matriculated from Jan van Riebeeck High with six distinctions, the Western Province's best matriculant in 1981. He also completed a BA (philosophy and politics) at the University of Oxford in 1991. Although Fagan comes from a family of practising lawyers, it was thanks to the encouragement and support of his UCT law teachers that he completed a DPhil at Oxford in 1997, which whetted his appetite for academic law.

"My thesis was a long time coming," he says of the work, titled *Constitutional Adjudication in SA*. "I started it at a time when South Africa did not yet have a Bill of Rights, but when it seemed likely that it would get one. As a result, the focus of the thesis changed as events unfolded here. Initially, I had thought to write on what should go into the Bill of Rights. But I ended up with a thesis that dealt with the interpretation of the Bill of Rights."

His P-rating, however, recognises his work in jurisprudence, which, by its nature, he says, purports to be of universal application. "I must confess the fanfare surrounding the P-rating came as a surprise. Because the NRF ratings are new to law, I applied for a P-rating without fully appreciating its significance. I had imagined that, were I successful, I would simply get a letter in the post and then it would be back to business as usual."

The news came on the eve of his departure to Germany last year to take up the Humboldt Fellowship. Fagan spent a month at the Goethe Institute in Bavaria and then went on to complete an 11-month stint at the Max Planck Institute for Comparative Private Law in Hamburg, where he did the groundwork for a new book on the South African law of delict.

"The reason for going to the Institute is that the book seeks to place the South African law of delict in a comparative perspective," he explained.

Before leaving to take up the fellowship, Fagan already had some German connections. In 1989 he was research assistant to Dr Reinhard Zimmermann, Professor of Private Law, Roman Law and Comparative Legal History at Regensburg University in Bavaria, an area he got to know quite well. Zimmermann is now director of the Max Planck Institute of Comparative Law and Fagan's host there.

Achievement runs in the family. His father, the Honourable Mr Justice Johannes Fagan, received an honorary LLD from UCT in December last year for his work as inspecting judge and head of the Judicial Inspectorate of Prisons. Anton's brother, Eduard, is an advocate at the Cape Bar,

Fagan continued

and their sibling Johan holds a chair in otolaryngology at UCT. Their uncle is the renowned restoration architect and yachtsman, Gawie Fagan.

Speaking at the luncheon to announce Fagan's P-rating last year, NRF vice president, Dr Gerhard von Greunewaldt, talked of the brain drain. Asked what kept him in South Africa, Fagan answered: "Like all white South Africans of my generation, I enjoyed benefits and privileges because they were denied to black South Africans. It is a debt that has to be repaid. And it is easier to repay it here than by slinking off to London or New York."

P-rated: Humboldt Fellow Assoc Prof Anton Fagan (Law) has received a President's Award from the National Research Foundation. The P-rating is made annually to top young researchers with exceptional potential and who are recognised by the international community as prospective leaders in their field.

Dual blows against malaria

Malaria claimed more than one million lives in 2003 according to estimates released by the World Health Organisation's Roll Back Malaria campaign. Most who died were Africans, the victims mainly in sub–Saharan Africa – and mostly children under the age of five. But closer to home, there is new hope as two UCT pharmacology researchers win ground against the affliction.

Dr Karen Barnes reports dramatically reduced fatality and improved cure rates following a change in malaria drug therapy, evaluated at study sites in northern KwaZulu/Natal, where effective mosquito control had recently been re-established. This combined approach promises to do the same for those living along South Africa's notorious malaria belt in the north east regions, as has been seen at study sites in Mpumalanga where malaria cases have also been halved in the past year.

KZN was the first Ministry of Health in Africa to adopt this approach. It was in January 2001 that an artemisinin-based combination therapy (ACT), artemether-lumefantrine, replaced sulfadoxine-pyrimethamine (SP), the drug previously recommended by the province's Department of Health. Results were startling. The annual confirmed malaria cases notified for KZN decreased by a significant 78%, from 41 768 in 2000 to 9 473 in 2001.

In addition, only 2 345 cases were documented in 2002, and 2 042 in 2003, showing that these benefits are sustainable. Barnes says that unlike SP (and almost all other malaria treatments), artemisinin derivatives have a direct effect of reducing malaria transmission. In addition to the ACT improving cure rates to 99%, Barnes and colleagues found a highly significant decrease in gametocytes, the stage of the parasite lifecycle responsible for malaria transmission.

The KZN study site is one of five sites that form part of a large collaborative venture, the South East African Combination Anti-Malarial Therapy (SEACAT), with Barnes as its principal investigator. This evaluation forms part of a collaboration between academic institutions and Ministries of Health in Mozambique, South

Dr Karen Barnes

Malaria continued

Africa and Swaziland, to study the effect of ACT on the emergence of drug resistance and malaria transmission, conducted on behalf of the Regional Malaria Control Commission of the Lubombo Spatial Development Initiative. Artemisinin is an ancient Chinese herbal remedy, qing hao, used traditionally for treating fever.

"Although there are a number of malaria control interventions that contributed to the observed reductions in malaria, just changing the treatment itself has had a significant effect, particularly in reducing the chances of someone with malaria dying," Barnes added.

The results offered by the KZN site have been particularly startling because the SP malaria treatment the province had been administering was failing.

"Twelve years after its introduction in 1988, SP was failing in 88% of people studied," Barnes noted. "In Mpumalanga, where SP was introduced in 1997, the failure rates are much lower as there has been less time for the parasite to become resistant to the drug."

By administering two treatments simultaneously there is less likelihood of treatment failure. And combination drug therapy also reduces the chances of drug resistance spreading.

"If you're giving two drugs, resistance to one of the drugs won't give the parasite a survival advantage because the second drug goes in, eradicates that parasite and it cannot be transmitted to someone else by a mosquito."

Dual drug therapy is not new. It has been commonly used to treat HIV/AIDS, TB and even cancer. "The lesson was learnt long ago," Barnes observed. "But because malaria has been the disease of the poor, people have tried to get by on very cheap single treatments and Africa is carrying that burden."

The value of the study has broader implications. By replicating the work done in southern Mozambique, Barnes hopes to establish a "level of relevance" for the rest of Africa.

"Benefits observed in South Africa, with its sound infrastructure and lower malaria transmission rates, might not be generalisable to the rest of Africa," she reflected. "Southern Mozambique, on the other hand, reflects more of the challenges of controlling malaria in the continent."

Back in the laboratory Barnes' colleague Dr Heinrich Hoppe, a Wellcome Trust International Senior Research Fellow, is tackling malaria at a more basic level.

Although the past two decades have seen significant progress in the development of malaria vaccines and the characterisation and introduction of anti-malaria drugs, the scientific community's understanding of the fundamental cell biology of malaria parasites remains disappointingly sparse, says the specialist in molecular parasitology.

While the humble cell presents a good springboard for plotting new ways of eradicating the parasite in its human host, work in this area has not been easy.

"Technical difficulties have been encountered in applying standard molecular and cell biology techniques and approaches to the malaria parasite," Hoppe noted.

So although researchers can grow the malaria parasites quite easily in the laboratory, manipulating these experimentally is very hard compared to other parasites, such as Toxoplasma, Trypanosoma and Leishmeinia.

But with the recent completion of the malaria genome sequencing project and the introduction of techniques to genetically manipulate the parasites, cell biologists like Hoppe have new skills to add to their arsenal.

Though some early successes have been achieved, genetic manipulation techniques remain difficult and there are few laboratories in the world with the capacity to undertake this kind of work. Hoppe aspires to boost local expertise in this area by establishing a parasitic cell biology programme that can compete internationally.

Having secured funds from several large institutions, including the Wellcome Trust in the UK, the MRC and the National Institutes of Health in the US, he has gone back to basics in his malaria research, looking at how the parasite's life cycle can be arrested after it enters the red blood cells.

"Once the infected mosquito has injected the malaria parasite (*Plasmodium falciparum*) into the bloodstream, it finds its way to the liver where it multiplies and divides," he explained.

During this period the victim is asymptomatic, becoming ill only once the parasite invades the red blood cells.

There's a good reason the parasites choose these vital cells: here they are hidden from the immune system.

Safely inside, the parasite grows and multiplies, forming dozens of little parasites. When the red blood cells burst, these are released to invade new red blood cells, causing one of the main symptoms of malaria: anaemia due to blood loss.

"The parasite also eats the red blood cells from the inside, taking up the red blood cell cytoplasm or components and digesting these for its own nutritional purposes," Hoppe expanded. "This uptake process is known as endocytosis."

Endocytosis is a fundamental cellular process and involves the ingestion of macro molecules and fluids from the outside environment. During the procedure, the membrane of the cell invaginates and then "pinches off", forming little vesicles containing their nutritional haul. Each vesicle delivers its contents to a specialised compartment in the cell, known as a lysosome.

"This is where the endocytosed material is degraded and digested as nutrients for the cell," Hoppe elaborated. "But if you can block this process of endocytosis you will literally starve the parasite to death."

It is a complex process, requiring the co-ordinated action of dozens of different proteins. But the good news is that Hoppe's group has made considerable progress in characterising the key components of the malaria endocytosis machinery.

Dr Heinrich Hoppe

Reducing the water burden

After five years of laboratory testing at UCT, a novel, integrated wastewater treatment system developed by Professor George Ekama and his team from the Water Research Group (WRG), has begun a two-year trial period at the Daspoort wastewater treatment plant in the Tshwane or greater Pretoria Municipal area.

The integration of the newer biological nutrient (nitrogen and phosphorus) removal activated sludge system and the older trickling filter system, is the WRG's current research area. The group is continually looking for ways to develop their understanding of the fundamental chemical, physical and biological processes operating in various water-related systems like water storage, transport and treatment plants.

Until the mid 1970s, trickling filters were used to treat the country's wastewater. This fixed media system involves big, round tanks filled with stones. Bacteria grow on the stones and, as the water runs over these, it is treated.

"The problem with the trickling filter, which is the reason it fell into disuse in the 1970s and 1980s, is that it does not remove the nitrogen and phosphorous nutrients from the wastewater," explained Ekama, who also heads the civil engineering department. "The activated sludge system became the preferred treatment system, because it could remove the nitrogen."

A suspended media technique, the activated sludge system allows bacteria to grow while swimming around in the water that is to be treated.

With activated sludge systems and trickling filter systems operating together at many wastewater treatment plants in South Africa, the WRG believes these two systems can be integrated to obtain biological nutrient removal on the full wastewater flow at a reduced treatment cost. This would greatly benefit municipalities and the receiving waters.

Ekama points out that, in order to appreciate the significance of this, the surface water quality problems in South Africa have to be understood, particularly in Gauteng where 50% of the country's gross domestic product is generated.

"Most international industrial regions are built near rivers or at the coast. Gauteng, situated on the Highveld, is troublesome because this is where the three main rivers that drain across South Africa have their headwaters. Any pollution generated in the Gauteng area will have an impact on the full river system, including all the dams, and not just a particular part of the river."

According to Ekama, eutrophication (the growth of algae in water), stimulated by the nutrients nitrogen and phosphorus, and salination (the build up of salt or total dissolved solids in water), through the high indirect reuse of surface water in Gauteng are the two main concerns for South Africa's surface water quality.

"Biological nitrogen removal was never a major problem because it could be accommodated in the activated sludge system without much difficulty. Phosphorous removal, on the other hand, was a big headache because up until 1975 it could only be removed from the water by adding chemicals. This would add thousands of tons of salt per annum to the treated surface water, exacerbating the salination problem."

In 1972, the policy guiding research was wastewater reclamation.

"The thinking was that, if we were going to the expense of chemical phosphorus removal, we might as well completely reclaim the wastewater to augment potable water supplies. In this way, reduced volumes of treated effluents would be discharged to the surface water," Ekama elaborated.

In 1975 Dr James Barnard and his research group at the National Institute for Water Research, together with

Waste not want not: Prof George Ekama (left) of UCT's Water Research Group (WRG), whose novel, integrated wastewater treatment system has begun a two-year trial period at the Daspoort wastewater treatment plant in Pretoria. With him are laboratory manager Talip Lackay and Professors Dick Loewenthal and Mark Wenzel.

the UCT's WRG and the Johannesburg City Council (at one of their full-scale activated sludge plants), found that phosphorous could be removed biologically in activated sludge systems. It provided a treatment system that could deal with the eutrophication problem without exacerbating the salination problem.

"Since 1980 South African has built biological nitrogen and phosphorous removal activated sludge systems," Ekama said. "UCT's name has been around the world because it has a biological nitrogen and phosphorus removal activated sludge system configuration named after it, called the University of Cape Town Process. Go to any conference on wastewater treatment and there will be a couple of papers discussing this system."

For many wastewater plants still using trickling filter systems to treat a part of their wastewater flow, the WRG has developed an external nitrification system that integrates the older trickling filters into the biological nutrient removal activated sludge system using the strengths of both.

The integrated system allows biological nutrient removal on the full wastewater flow, usually without building any additional units.

A re-engineered combination of the two systems is important because removing phosphorous chemically not only costs money but also adds to the salt load of the receiving water, Ekama reported.

The project has received acclaim as a former finalist in the Technology and Human Resource Improvement Programme (THRIP) excellence awards and is supported by Water Sanitation Services South Africa, a subsidiary of Ondeo Services, Paris.

"The WRG, which includes Associate Professors Mark Wentzel and Dick Loewenthal and laboratory manager Talip Lakay, is an interdisciplinary one involving students from various departments," Ekama noted. "In its 25 years, 63 students have obtained their MSc degrees and 19 their PhDs.

Designated a centre of expertise by the Water Research Commission, the WRG is supported by the commission, through contract research, as well as by the National Research Foundation under its Distinct SA Research Opportunities and Sustainable Livelihoods focus areas.

Telecommunications revolution in China

"China is like a sleeping giant. And when she awakes, she shall astonish the world." – Napoleon Bonaparte, 1803

In certain aspects, the changes in China during the past two decades have been startling, similar to the former USSR, where Western goods and culture have been widely welcomed by the urban elite, says Professor Doug Pitt, UCT's Dean of Commerce, as a prelude to his recently released book, *Chinese Telecommunications Policy*.

As China moves fully onto the international stage – as indicated by its recent admission into the World Trade Organisation – foreign trade is increasing and new technology is being embraced "with a vengeance", the author observes.

"The giant is fitfully wakening," says Pitt. "It is clear that the Chinese government has made strenuous efforts to engage those developments that attract foreign capital and which lead to trade with the West. Special economic zones have been created around the coastal fringe to emulate the successful Hong Kong model."

In particular, the telecommunications industry in China has undergone a "seismic" revolution over the past 20 years, and underpins the Chinese government's ambition to modernise this vast, overpopulated country. Pitt has a special interest in telecommunications.

In his new book, co-authored with Professor Xu Yan of the Hong Kong University of Science and Technology, he offers an in-depth study of telecommunications development in China, from its inception in the 1870s to the current environment, including all the inherent contradictions and complexities.

In the past, says Pitt, telecommunications in China was the sole preserve of state companies and central government. "The Peoples' Liberation Army, for example, ran its own businesses and had its own telephone company. But the Chinese have realised they need to establish companies to push telecommunications development at a greater pace." It is not a Western model of development, Pitt adds. "This is liberalisation with Chinese characteristics, set in a bureaucratic, centralised system. Hence the dynamic tensions inherent in the change."

But why study China? The reasons appear clear: China, despite a low per capita income, is the seventh largest trading nation and the world's fastest growing economy. Its evolution from a centrally planned economy to one that is moving to embrace free market systems is a live case study, holding valuable lessons for policy makers, notes Pitt.

"In the liberalisation of the Chinese telecommunications industry, which was marked by the establishment of China Unicom in 1994, we have an apposite place to look at change," he explains. "It's almost like a laboratory for technology and economic policy. For this reason China has attracted the interest of many researchers and policymakers throughout the world."

It also provides a useful lesson for developing countries like South Africa. While the two countries may seem worlds apart, in many ways South Africa is a microcosm of China: with a dual economy that feeds an urban elite and expanding middle class, but with vast sections of the rural population excluded from economic development.

The book reflects an accumulation of insights gathered over a period of time and includes the results of several field trips to China. The collaboration with a Chinese co-author was obviously useful. The authors have ties going back to Yan's PhD studies in business under Pitt's wing when he was a professor at the university of Strathclyde. Today Yan is an assistant professor in the Department

Prof Doug Pitt

of Information Systems Management at Hong Kong University of Science and Technology. He is also on the board of directors of the International Telecommunications Society. The two have teamed up on numerous projects and studies.

The fieldwork for this book occurred in two tranches: from 1994 to 1996 when both were resident in Scotland, and later involving more intensive fieldwork post-1997, when Yan relocated to Hong Kong. Since 2000, Yan has participated in several training programmes for officials from the Ministry of Information Industry as well as executives from Chinese operators such as China Telecom and China Mobile. This provided opportunities for face-to-face contact with "policy influentials" in Chinese telecommunications.

The book was written on top of a day job as Dean of UCT's largest faculty. Most of the text was compiled at his temporary home in Lover's Walk soon after he arrived at UCT from Strathclyde Business School in Glasgow. Pitt is also chief editor of the substantial journal *Telecommunications Policy*, which has 11 editions a year. It's an onerous job but one that keeps Pitt in touch with international telecommunications policy.

Zygote's Homeric journey stuns medical fraternity

It was a journey of Homeric proportions, liver surgeon Professor Jake Krige said of baby Nhlahla Ncise's beginnings. Krige was one of the medical team involved in the delivery of what was described by the medical fraternity as a "miracle baby" last year.

Nhlahla's survival made world headlines after senior obstetrician Dr Bruce Howard gently extracted her, at 39 weeks, from behind her mother's liver, putting paid to some formidable survival odds.

The story precipitated huge media interest.

What were the chances that the zygote, smaller than a pinhead, would slip from 20-year old Cwayita Ncise's fallopian tube, survive and then embark on a miraculous upward odyssey, via abdominal fluid and between the convolutions of intestines and internal organs, to fortuitously implant itself on her mother's liver, an organ with sufficient blood supply to nurture the embryo to full term?

Dubbed "the liver baby", little Nhlahla presented the UCT medical fraternity at Groote Schuur Hospital (GSH) with some anxious moments, however. Only 14 other such extra-uterine cases had been reported. As a result of bleeding complications, only three mothers and babies had survived.

Extra-uterine pregnancies, which can develop on the outside of the uterus, or even get their blood supply from the bowel, are always difficult to treat. But Nhlahla's location in her mother's abdomen initially had the cohort of UCT and GSH medics, registrars and specialists scratching their heads.

One week short of full-term, Cwayita Ncise had been referred to Somerset Hospital with high blood pressure. On duty in the labour ward that night was sixth-year medical student Lindsay Bick, who completed Ncise's clerk sheet.

"She looked like a normal pregnant woman," Bick recalled. However, on examining her, Bick couldn't find the baby's head, usually easy to detect in the pelvis at 39 weeks. "The baby's bottom was also very high in the abdomen," she reflected. Puzzled, she alerted her supervisor, registrar Dr Saadiqa Allie. Allie conducted an ultrasound scan and confirmed Bick's misgivings; she could not locate the baby's head either - and the uterus was empty.

Transferred to GSH, Ncise was examined by senior registrar Dr Howard Manyonga and consultant Dr Silke Dyer. Subsequent scans confirmed an advanced extra-uterine pregnancy and the location of the placenta in the upper abdomen.

"We see about five or six cases of extra-uterine pregnancy a year," noted Howard, a specialist in gynaecological cancers and difficult surgery. As these cases are rare, he remembers looking forward to the operation.

Inside the theatre, the drama deepened. The Caesarean section revealed a further puzzle; all Ncise's organs were in place (even the empty uterus), but there was no baby. Flanked by an enthralled cluster of 30 or so doctors and fifth- and sixth-year medics, Howard described the moment as "very frightening". Instead of a foetus, he found a massively enlarged liver and placenta.

"It was a time bomb waiting to explode."

Liver surgeon Prof Jake Krige was at a liver clinic nearby when he received a distress call at 11h00: a cryptic message from the obstetrics theatre to deliver a baby, not his usual line of work. He rushed to a scene of "enormous anxiety".

"The placenta in its amniotic sac lined the liver. Its removal would have resulted in catastrophic bleeding," he elaborated. In highly complex situations like these, he says, there are no rules of engagement.

"These cases require on-the-spot improvisation and every situation will be different. But it was clear we had to find a way in."

The team mobilised the liver, working quickly to free it from its attachments. And providence is always kind. At the bottom of the large organ, Krige and Howard found a 5 cm-diameter window, a small area where the placenta and amniotic sac weren't attached. It offered the sole entry point. An incision was made and Nhlahla's delivery began, feet first.

"It was extraordinary," Krige remarked. "A breach delivery from the liver."

There was initially little time for euphoria, however. The baby was distressed and needed resuscitation. The placenta had also started to bleed and the bleeders had to be tied off. Krige and the team were also left with a crucial decision: how to manage the remaining placenta.

"The trick was to leave the placenta attached to the liver," the surgeon noted. The extraneous tissue would be absorbed in two months or so and the organ would return to its normal size. "The liver has phenomenal regenerative capacity," he confirmed.

The news of Nhlahla's birth spread like proverbial wildfire. Within hours, news hounds, armed with large cameras and even larger lenses, thronged the corridors of GSH. "It was unbelievable," Howard remarked. "My phone did not stop ringing."

Baby Nhlahla's story and picture were splashed across the world's media: the BBC, CBS Canada, Radio Asia, and even the front page of *The Times* in London. Even *Ripley's Believe It or Not* wanted the story, the latter raising more than a few eyebrows in the medical streets of GSH.

Lady Lucky: Sixth-year medical student Lindsay Bick (back), with mother Cwayita Ncise, the baby's father Ndumiso Mashiyane and the miracle baby, Nhlahla ("lucky" in Zulu). It was Bick who first saw Ncise at Somerset Hospital and reported to her registrar that she couldn't find the baby's head in Ncise's pelvis.

The remarkable operation thrust GSH into the spotlight. Both Krige and Howard were full of praise for the multidisciplinary team's efforts and the sterling obstetrics services available in the province. However, there was an irony that was not lost on them.

"If Cwayita had had access to ultrasound from the beginning, as is the case in first-world countries, the pregnancy would have been terminated," Howard commented. "We had a healthy mother and baby." The case has been well documented as he and Manyonga have written a report for submission to a respected medical journal.

Nhlahla, by the way, is the Zulu name for "lucky". One feels she could as easily have been named Umlingo, or "miracle". And though some may be tempted to follow her life's path, just to see why fate was so determined she should be counted among the world's populace, her mother had it all worked out: Nhlahla would be a doctor, she said emphatically.

Going for gold

2003 was a very good year for chemical engineering PhD student Noko Phala.

Not only did he present his work on the application of the fundamentals of quantum physics to understanding the diversified uses of gold at a premier international conference, but he also earned an invitation to research this topic with leading experts at The Royal Institution of Great Britain.

The potential for gold to function as a heterogeneous catalyst for synthesis gas conversion to methanol (in addition to its jewellery, dental and investment-type applications) is a problem of common interest to both Phala and the institution's Professor Richard Catlow.

After Phala obtained his BSc (chemical engineering), first class honours, at the end of 1999, he joined AngloGold, where his work as a metallurgist gained him new insights into the day-to-day operations of a gold processing plant.

As he explained: "After all my studying this was a 'real world' experience for me. I loved learning about the technical issues. But even more fascinating was the opportunity to engage with people and management issues."

It was during 2000 that AngloGold and Mintek initiated Project AuTek to investigate the possibilities of expanding the uses of gold. It was due to this that the company sent Phala back to UCT to complete a MSc and PhD to provide them with an academic study of this area.

"Although AngloGold is about mining, selling and marketing gold, they would like to expand their marketing efforts into other potential applications in the future," Phala noted. "I am happy to be working on this project and to be part of the process of ensuring that the market for gold expands and therefore becomes more stable.

"My three months in Britain allowed me to bring back to UCT knowledge of what gold is and isn't able to do," he adds.

Since 1995 the Catalysis Society of South Africa has sponsored an international expert in catalysis to meet with interested South African research groups.

During 2003 the society introduced a student travel grant enabling South African postgraduate students to present their work at international, peer-reviewed conferences.

The accolade was awarded to Phala and two others: fellow UCT Catalysis Research Unit member, Itai Mabaso, and Nishlan Govender of the University of Natal's chemistry department.

Phala attended the *GOLD2003: New Industrial Uses for Gold* conference held in Vancouver, Canada.

With approximately 300 participants representing industry and academia in a wide range of fields, from gold chemistry to materials science and nanotechnology, Phala was involved in scientific discussions with world-class experts.

"It was a wonderful opportunity to engage with scientists, most of whom you 'know' from their many intellectually stimulating publications. Having the chance to tell them what we at UCT think was quite a pleasure."

Examining the reaction between carbon monoxide (or carbon dioxide) and hydrogen (derived from natural gas or coal), Phala's paper detailed the potential use of gold as a methanol synthesis catalyst.

"My paper was theoretical in nature," he explained. "Looking at the surface of a two-dimensional infinite gold surface versus a collection of 13 gold atoms, I tried to understand on which of these two systems the reaction would occur and why.

"The theoretical techniques that were used are based on the principles of quantum physics and chemistry and are quite useful in understanding the atomic-scale behaviour of matter."

Having met many people at the conference, Phala believes future collaborations are imminent.

"Although we did not attempt to finalise everything at the conference, we are aware of each other's work and there are going to be many fruitful exchanges in the future."

Bright star: Precious metal researcher Noko Phala's work is ensuring that the market for gold expands and becomes more stable.

Of breeds, braks and *boer* dogs

Domesticated dogs have been around for many years, records showing that the first primitive ur-dog appeared in Germany around 14 000 years ago. While little is known of the early dogs of southern Africa, in 1497 Portuguese explorer Vasco da Gama saw dogs in a San community at St Helena Bay. Although history has presented an ambivalent image of dogs, they mirror the distinctive aspects of national, social and political identity, as two environmental historians have found.

In their suite of essays *Canis Familiaris: A Dog History of South Africa*, UCT's Dr Lance van Sittert and co-author Dr Sandra Swart (Stellenbosch University) have recovered the dog's "ubiquitous yet invisible presence in southern African history".

"The use of the dog to think about human society has a long scholarly pedigree and the recent animal turn in the humanities has sparked a florescence of canine studies," said Van Sittert.

The two, who are co-secretaries of the Historical Society of South Africa, were brought together by divergent avenues of research. Van Sittert wrote about the 1893 rabies epidemic in Port Elizabeth and the extermination of wild carnivores in the Cape Colony between 1889 and 1910. Swart had tackled the issue of wild and domestic dogs (the latter brought in distemper) in the Hwange National Park in Zimbabwe for her MSc thesis at Oxford in 2001.

Popular South African dog breeds, they contend, have come to signify the national South African identity through the various stages in our history.

"Each epoch of human-canine interaction in the sub-continent produced its own peculiar animal, literally a pre-colonial, colonial and post-colonial dog, as well as its 'dark doppelganger', the wild 'kaffir' or stray dog," Van Sittert noted.

It is likely the latter were the ancestors of those dogs introduced into southern Africa 2000 BP (Before Present) by Bantu-speaking agriculturalists and/or Khoikhoi pastoralists, Swart contended.

In the mid-17th century, dogs became an integral member of what the duo call the "portmanteau biota", part of the flora and fauna that escorted European settlers to southern Africa.

By the start of the 19th century, dogs were pervasive in the colonial countryside, "a good pack of dogs being necessary for travel in the region", according to early European explorers.

The second half of the 19th century marked a major watershed in the region's canine history as a new sensibility towards animals emerged among the urban middle class, modelled on Victorian Britain.

"This embodied the notions of humanitarianism and sportsmanship in their increasingly detached and ritualised relations with domestic and wild animals," Van Sittert noted.

Swart added: "The institutionalised dog breed was founded on Victorian typological thinking about race, quality, purity and progress. The value placed on breed purity was based on older ideas of human aristocracies and thoroughbred animals, and was to resurface in the Nazi endeavour to breed an Aryan superman."

The withdrawal of British control over the region in 1910, coupled with the rising tide of settler nationalism, both endorsed the fundamental tenets of the imperial canine order and forced a continual revision of the boundaries of class and quarantine to suit the shifting requirements of the new imagined

national community.

This, noted Van Sittert, was reflected in the pairing of the young British proconsul with the runt of a mongrel (*boer* dog) litter in Percy Fitzpatrick's *Jock of the Bushveld*, published in 1907. "The suggestion was that the hybrid - not the thoroughbred - was designed to inherit the colonial earth by virtue of its Darwinian competitive superiority."

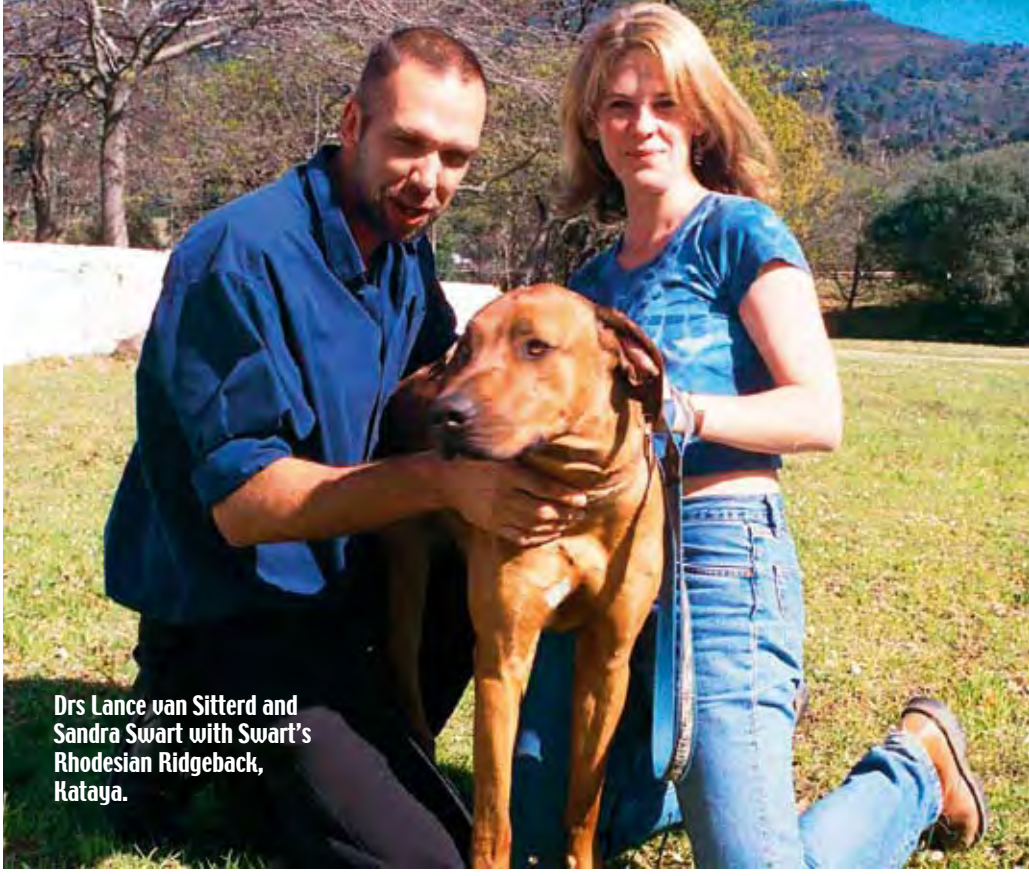
In the wake of this, the *boerhond* was lauded for its pluck, endurance and talent for hunting leopards and baboons. It was something uniquely South African on the eve of the Union.

In the 1920s the *boerhond* was admitted to the South African Kennel Club register. Bred to hunt lions, the dog's future was secured, not by South Africans, but by Rhodesian settlers, where, on the brink of white statehood, a Rhodesian Ridgeback (Lion Dog) Club was formed in the mid 1920s. (The Ridgeback enjoyed great popularity, even topping the South African Kennel Union registrations between 1946 and 1948.)

The dog also became part of broader societal changes. World War 2 accelerated African urbanisation and, amid fears of the *swart gevaar*, many urban whites looked to Afrikaner nationalism for political salvation and a powerful dog breed "forged on the frontier" for personal protection.

"Post-war demand was huge," Van Sittert commented, "even jeopardising the maintenance of breed standard."

The Ridgeback became a national dog, representing the settler communities. However, the rise of white affluence after the war made it difficult to maintain fidelity to a national breed and the Ridgeback's popularity was swiftly usurped by the collie in 1949 (following Lassie's immortalisation in Hollywood) and, later, the Alsatian.



Drs Lance van Sitterd and Sandra Swart with Swart's Rhodesian Ridgeback, Kataya.

The dog became an easy metaphor for apartheid.

The enduring popularity of the Alsatian (top national breed 1952-89) and Doberman pinscher (1976-78) also reflected escalating black opposition to apartheid after 1960. Among whites, the preference was clearly for large, fierce dogs.

"By 1980 only four of the 177 recognised breeds - Alsatian, Rottweiler, bull terrier and Doberman - accounted for one-third of all SAKU annual registrations," Van Sittert added. "Interestingly, the staffie ousted the Alsatian in 1989, having been cast as the *boer* dog in the Hollywood version of *Jock of the Bushveld*." (A record 8 557 staffie registrations were recorded by the SAKU in 1991.)

The current popularity of imported breeds (bulldog and Labrador) masks an underground preference for American pit bull terriers in both white suburbs ("the last line of defence against the barbarians loosed by democracy") and townships and rural areas, enhanced by post-apartheid promotion of gambling in which dog-fighting, although illegal, has provided another outlet for the national

Dogs continued

gambling proclivities.

More interesting still, Swart added, is the ongoing attempt to replace the Ridgeback as the national breed with its purported African ancestor, *Canis africanus*.

An African Indigenous Dog Project was established under the aegis of the SAKU and the National Cultural Museum to initiate a breeding programme.

"Homing and DNA testing were duly employed to reinvent this 'mangy township mongrel' as *Canis africanus* - the dog of Africa - a new national breed appropriate to the post-1994 rainbow nation," said Swart.

"It has been linked to the African Renaissance of the 21st century and its popularity grounded on a newfound pride in things purely African."

But the authors are sceptical of claims of its "authentic and untouched" lineage.

"It's a business," Swart contended. "Simple biology tells us this lineage is unlikely."

It is also ironic, she says, that the rehabilitation of *Canis africanus* is an exclusively white project.

"It has no perceptible purchase on the popular imagination of the black majority for whom dogs remain a symbol of white oppression, following their use by the police and the army to 'sniff out' criminals and guerrillas."

ACE protein heralds new heart drugs

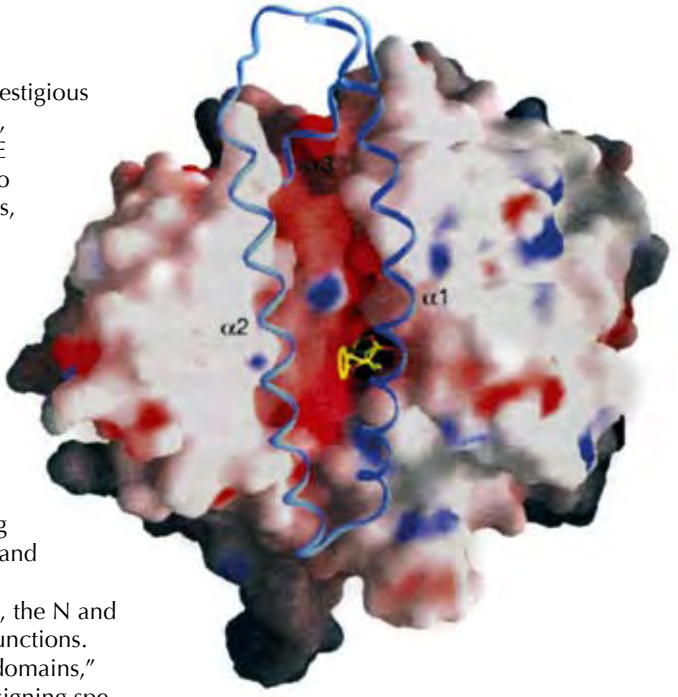
To the eye, the magnified three-dimensional image of the human ACE protein molecule may resemble an amorphous cluster shape of little significance. But to a UCT research team and their Bath collaborators, the newly mapped angiotensin-converting enzyme (ACE) structure holds the key to the development of new-generation drugs for treating high blood pressure, myocardial infarction (heart attack), heart failure and a string of related ailments.

UCT researchers Dr Ed Sturrock and Sylva Schwager (Medicine and Clinical Laboratory Sciences) and their collaborators at Bath University, Professor Ravi Acharya and Dr Ramanathan Natesh, have determined the first 3-D crystal structure of ACE and its complex with one of the most widely used inhibitors, lisinopril. Lisinopril works by interacting with the ACE protein and causing widening of the blood vessels, thus lowering the blood pressure and helping the heart to work more effectively.

The details of their work, which is supported by the Wellcome Trust (UK), appeared as an advance online publication in the prestigious *Nature* journal (*Nature* 421, 551-4 [2003]) last year. ACE inhibitors are widely used to treat cardiovascular diseases, including hypertension, heart failure, coronary artery disease, diabetes and kidney failure. But current ACE inhibitors, developed in the 1970s and 1980s, produce common side effects. These include a persistent cough and angioedema (an allergic reaction causing swelling of the eyes, throat and tongue).

"ACE consists of two parts, the N and C domains, with different functions. Current drugs inhibit both domains," Sturrock explained. "By designing specific domain-selective ACE inhibitors we expect to produce second-generation drugs that are more effective and have fewer side effects."

Having determined the 3-D structure of ACE, researchers can begin synthesising new ACE inhibitors using structure-guided drug design. This process will involve a range of scientific input as



Up close: The molecular surface representation of the human angiotensin-converting enzyme (ACE). The ellipsoid shape of the ACE structure has a central groove extending into the molecule, dividing the protein into two sub-domains. The lisinopril molecule (the inhibitor) is shown in yellow.

ACE molecule continued

computational chemists and structural biologists begin the complex molecular modelling process, using existing inhibitors as scaffolds on which to build new drug compounds. This work will be done in the UCT and University of Bath laboratories.

Novel C- and N-domain-selective inhibitors will then be evaluated for further development in partnership with pharmaceutical companies. AngioDesign, their "virtual" company in which the two universities and the Wellcome Trust have preference shares, will explore the commercial potential attached to the design of new drugs (www.AngioDesign.com). "The potential is huge, but the time from breakthrough to presenting new drugs on the market is anything between 6 and 12 years," Sturrock added. He and Acharya have taken out an international patent on their work, owned by both universities.

The UCT research group involves diverse disciplines and is part of the South African Structural Biology Initiative, which makes protein structure determination available in Africa for the first time. The research is unique in the sense that it covers a range of disciplines, from recombinant DNA technology (DNA that has been created artificially by "gene jockeys") to structural biology and synthetic chemistry.

A UCT alumnus (after honours he completed his PhD in 1993), Sturrock began work on the ACE protein ten years ago at Harvard Medical School while on a Fellowship sponsored by the National Research Foundation and National Institutes of Health. It was at Harvard that he established links with his Bath collaborator.

After returning to South Africa, Sturrock set himself the goal of maintaining and developing his collaborations with leaders in this field abroad.

"This was particularly important as the skills and technology in protein X-ray crystallography were lacking in South Africa and in the Western Cape," he noted. Sturrock is a recent recipient of a Wellcome Trust Senior Research Fellowship that has secured him a further five years of funding for this project.

Solving the crystal structure of ACE has been a long haul and all-consuming work. "The main challenge is to get the protein to form tiny crystals and to make sure that they are suitable for X-ray diffraction studies," he elaborated. "Once you have the crystals it is still a very technical and involved process to conduct the X-ray studies and solve the structure."

Publishing in *Nature* has certainly added to Sturrock's international reputation. "It's not an everyday occurrence," he notes. "It's a scientist's dream, especially as very few *Nature* papers have been published by South African researchers."

As a result, he was invited to deliver a talk at the International Protease Conference in Japan last year. He is also hoping the recognition will act as a springboard to major advances, not only in understanding the ACE protein, but also its interaction with its inhibitors.

Dedicated team: Dr Ed Sturrock (left) and his researchers (from left) Sylva Schwager, Zenda Woodman, Pierre Redelinghuys, Aloysius Nchinda and Ayesha Parker, whose collaborative efforts with Bath University researchers have identified the first 3-D crystal structure of the human angiotensin-converting enzyme (ACE). Here they study a model of the ACE inhibitor, lisinopril.

Jewel in UCT's crown digitised for world's scholars

One of the "jewels in UCT's crown" and one of the world's largest and richest folklore collections, the Bleek Lloyd Collection, is being digitised to create a web-based resource that will be available to scholars around the world.

The collection captures the lost language, customs and mythology of the indigenous /Xam people. The potential for scholarly work on the collection is vast. "The collection is almost unique in southern Africa as an archive of indigenous ethnography," said the Michaelis School of Fine Art's Professor Pippa Skotnes.

With funding of over R1-million from De Beers, the Mellon Foundation and the Scan Shop, who have subsidized the scanning component of the exercise, Skotnes devoted most of her sabbatical year in 2003 to this work.

Compiled by Lucy Lloyd and her brother-in-law, German linguist Wilhelm Bleek, over a period of 15 years during the latter part of the 1800s, the collection is considered by archaeologists, ethnographers, linguists and others as a significant link to a lost culture and language, and offers scholars a rare opportunity to "fill in one of the tragic blanks in South Africa's history".

The 14 000-page collection includes interviews, conducted in Bleek and Lloyd's suburban Mowbray home,

Prof Pippa Skotnes (right) and her assistant, Eustacia Riley.

Bleek Lloyd continued

with /Xam (San) prisoners who were incarcerated at the Breakwater Convict Station after the Korana War of 1868, and later with !Kun speakers from northern Damaraland. It contains lexicons, Bleek family records, biographical information, drawings, watercolours, photographs and correspondence with family and colleagues in many parts of the world.

The UCT Manuscripts and Archives, the National Library and the South African Library hold the collection jointly. In 1997 it was listed as a work of world significance on the prestigious UNESCO Memory of the World Register, the highest honour any historical document or collection can receive.

In 1870 //Kabbo, one of a few /Xam convicts held at the Breakwater prison, met Bleek and Lloyd, who realised the future of this language was in danger. With //Kabbo as their first teacher, Bleek and Lloyd managed to study the language and gain important insights and interpretations of the rock art.

After Bleek's death in 1875, Lloyd worked on alone for a further 10 years, collecting the /Xam stories and oral history and making the major contribution to the collection. "Lucy was a remarkable woman and a visionary scholar," Skotnes said of Lloyd.

By 1910 when Bleek's daughter Dorothea visited descendants, no-one could remember any of the /Xam stories, nor did they speak the language. And although Lloyd and Dorothea and others published several works from the corpus, much has remained unpublished and, in a sense, hidden.

Skotnes began working on the collection in 1986, and later published a book with Professors Nigel Penn, Stephen Watson and John Parkington (which won a UCT Book Award), *Sound from the Thinking Strings*, which drew on the material. "But I felt it required some serious curation," Skotnes noted.

Lucy Lloyd

Once high-resolution scans of the material have been completed, a major website will be constructed, through which the full collection can be accessed. One of the largest tasks for Skotnes and her assistant, Eustacia Riley, has been to develop a way of categorising and indexing the collection so that it will be fully searchable. They began their work in November 2002 and have completed the scanning and the index, including full summaries of each narrative and personal histories of the individuals involved with Bleek and Lloyd's great project.

De Beers has given further funding for a book to accompany the website, to which a number of UCT and other scholars are contributing. Both will be launched later this year.

The Mellon Foundation has a global programme of digitising significant collections and making these available to scholars. "We are now part of that programme and derive the benefit of access to other collections that they have digitised."

"When Lucy Lloyd learnt the /Xam language from //Kabbo, who was described as a careful narrator, he said that he was very keen that his stories should become widely known by way of books. He couldn't have had any sense of what the worldwide web might be," she commented.

"But I think he would have been pleased."

New contraceptive possibilities

The days of women suffering from premenstrual syndrome (PMS) and shouldering the responsibility of contraception may be a thing of the past if two studies from UCT's department of obstetrics and gynaecology are anything to go by.

Testing a non-hormonal contraceptive for women and hormonal contraceptive alternatives for men, head of department Professor Zephne van der Spuy and her team form part of the Contraceptive Development Network, a research group established about ten years ago.

With its head office based in Edinburgh and funded by the Department for International Development in the United Kingdom and the Medical Research Council (UK), the Network has centres in Shanghai, Hong Kong and Sagamu (Nigeria).

Although a number of projects have already been completed in this collaborative network, the present studies represent a further development in both male and female contraception.

The first study, which involved 13 women and ran over six months, investigates the use of a non-oestrogen-containing pill and compares it directly with the progesterone-only pill, which is the usual choice for women wishing to use a non-oestrogen pill. The use of an anti-progesterone hormone makes the lining of the uterus unfavourable for pregnancy while also preventing ovulation.

"We want a pill that is effective, that eliminates the side effects of oestrogen and then allows women not to have periods," explains Van der Spuy. "This will be a phenomenal advancement for female contraception."

The second study compares different hormonal treatment regimens for contraception in healthy men. Previous work within the network has demonstrated the efficacy of a combination of testosterone and progestagen as a contraceptive agent in men.

In this study, eight male volunteers' sperm count is being monitored over a year to assess the effectiveness of the treatment.

A progestagen implant, no bigger than a matchstick, is inserted under the skin of a volunteer's upper arm. This implant is responsible for the suppression of the function of the testes.

A second implant of testosterone (about the size of a rice grain), is inserted under the skin of the stomach and is responsible for replacing this hormone.

According to Dr Richard Anderson, an obstetrician gynaecologist who works in the network in Edinburgh and who visited Cape Town to audit the practice, this form of contraception has modest side effects and sexual function remains normal.

"The process is completely reversible, meaning the implants can be removed and fertility will return to normal after a couple of months."

Prof Zephne van der Spuy

SOS through SMS

Cell phones may be the ubiquitous accessories of the early new millennium, but a group of researchers is putting the handheld gadgets to more humanitarian use, this time in a hi-tech but elementary solution for the treatment of HIV/AIDS.

Endorsed by Cabinet last year, the rollout of an antiretroviral programme for South Africans with HIV/AIDS will be the biggest undertaking of its kind in the world.

But antiretrovirals are complicated regimes of medication, requiring strict patient adherence. You can't skip a day, or be without medicine if the stock hasn't arrived at the clinic. With an estimated 4,2 million South Africans living with HIV, the highest infection rate in the world, it will need some innovative, beyond-the-box solutions to ensure people get the right drugs - and take these on time.

This is exactly what Cell-Life, the brainchild of a group of UCT engineers and doctors and the engineering department at the Cape Technikon, offers. Cell phones provide a virtual infrastructure that allows medical professionals to keep tabs on their patients and alert authorities when antiretroviral stocks run low. The latter is particularly important. Any break in the regime could see a patient developing drug-resistant strains of HIV. It could also mean reduced drug efficacy once treatment is resumed.

Under the umbrella of Cell-Life, the engineers have devised a management system using cell phones, the Internet and database systems to provide communication, information and logistical support for the complicated antiretroviral drug regimes. Cell-Life is able to monitor patients' symptoms and compliance, track trends and give clinics early warnings when drug supplies run short, circumventing a crisis of non-compliance.

The project, which has been successfully piloted in Gugulethu since September 2002, was recently given an additional R2-million boost from Vodacom to expand. The cell phone company's noble goal is to become the backbone of HIV/AIDS management in Africa.

The development signals a significant breakthrough in the provision of antiretrovirals. Much of the focus on antiretrovirals has centred on provision costs and toxicity levels. Little has been written about the sophisticated management involved in providing the therapy.

Project leader Dr Ulrike Rivett of UCT's Civil Engineering Department believes the beauty of Cell-Life is that it can create a virtual infrastructure covering 90% of the country, using technology that is both accessible and acceptable to all South African communities.

She is persuading health departments to come on board. Vodacom, in turn, is challenging other cellular companies to support Cell-Life's development which, as a homegrown, not-for-profit system, could save the government millions.

HIV therapy involves several drugs that can be taken either individually or, more effectively, in a so-called triple treatment. But effective therapy requires 95% adherence to be effective and most therapies need to be supported by a strict time-and-diet regime. Medication has to be taken several times a day for the rest of a patient's life. The medication can also cause a range of side effects, which need to be monitored to avoid the patient becoming ill or abandoning the treatment.

The system works by providing health workers with cell phones loaded with Cell-Life software, which they use to gather important information during their regular visits to patients. Using drop-down menus, the health workers monitor drug adherence by recording how many pills are left in bottles, and record patient symptoms and severity on the cell phone. They can also alert doctors on call in the event of an emergency.

The phones send this information by SMS to a central database, accessible to doctors and nurses via an Internet application on the Cell-Life web page. All patient information is recorded on this database, which offers the same security as online banking.

Selected people have access to the data and can log on through the web page to check on individual patients and monitor drug stocks.

On call: (from left): Prof Jon Tapson, Samir Anand, Munier Parker, Dr Ulrike Rivett and Jalal Ghiassi-Razavi show off the new cell phone technology they hope to use in the fight against HIV/AIDS.

The innovative project has its roots in a UCT engineering outreach programme in 1999 when Rivett was delivering a talk at the Cape Technikon's Mother and Daughter Day. Her session was aimed at encouraging women to become engineers. It was during the ensuing question-and-answer session that a young woman asked what engineering was doing to prevent the spread of HIV/AIDS.

"I was floored," Rivett admitted. "I really had no answer. But it got me thinking. I came up with an idea for a pillbox that would send signals to a database."

It was Professor Jon Tapson from UCT's electrical engineering unit who suggested that using existing technology would cut costs.

"Cell phones provided a ready solution," Rivett said.

"We don't have the resources to build the roads, hospitals and clinics that engineers devote their energies to, but we can build virtual infrastructures, with databases of patients, all over the country."

Entomologists in a flutter over new insect order

THE RECENT recognition of a new order of insects, *Mantophasmatodea*, has been dubbed as "one of the most exciting" recent discoveries in zoology, boosting the total number of insect orders (beetles, flies, fleas, etc) to 30.

The formal description by entomologists in 2002 of the fairly large, wingless creature, which to the untrained eye resembles a cross between a grasshopper and a praying mantid, follows almost a century after the last description of a new insect order, that of the ice crawlers (*Notoptera*) in 1914.

Small and bandy-legged, the wingless insects from the new order are aggressive carnivores, leaping on their prey and subduing them with their spiny, enlarged forelegs. They walk on their heels, with the last part of the "foot" always held up in the air, hence their common name Heelwalkers. They are grey, brown or bright green in colour, and each species comes in an array of colour forms.

The female is bigger than the male and in captivity often eats him after a prolonged and uninterrupted copulation of about three days. In South Africa, in late spring the female lays a series of up to 10 egg pods in the sand, each containing about 12 eggs, which develop and hatch during the wet winter months. Adults appear in spring and die after about one month.

Though scientists have found the insects embedded in Baltic amber, suggesting that they existed around 40 to 50 million years ago in Europe, the new order appears to be restricted to southern Africa in present times.

German insect anatomist Dr Klaus Klass and researchers Oliver Zompro, Professor Niels Kristensen and Professor Joachim Adis described the new order in *Science* magazine (24 May, 2002, Volume 296, pp 1456-1459), based on only two old museum specimens collected from Tanzania and Namibia. A search for extant populations, led by Windhoek Museum's Dr Eugene Marais to Namibia's Brandberg, located the first living Heelwalkers. It later transpired that the two species collected were new to science.

The article caught the attention of UCT entomologist Dr Mike Picker. Though it referred to the Namibian and Tanzanian specimens, Picker realised he and his students had frequently encountered the insects in South Africa.

Picker wrote to *Science* reporting that he and students Jonathan Colville, Anthony Roberts and Mark Kirkman had previously noted the unusual orthopteriod insects in the semi-arid regions of the Succulent Karoo (Namaqualand). "It emerged that we hadn't realised the evolutionary significance of the creatures we'd collected so frequently in Namaqualand," he added.

At the time, the insects were dormant in the egg phase, and Picker did not have specimens to back his claim. He decided to search the extensive insect collection of the Iziko Museum, Cape Town (formerly the South African Museum), where he recovered 29 pinned specimens, collected from 1890 to 1994. These had been placed with various other insect groups such as praying mantids, and had been forgotten for almost a century.

After Picker's letter appeared, Klass contacted him, and they subsequently established a collaboration, the South African Mantophasmatodea Project, which brings together researchers from Japan, Germany, Denmark, the US and Namibia. (The project also involves collaboration with the Iziko Museums of South Africa and the Agricultural Research Council's Plant Protection Research Institute in Pretoria.)

The team has been studying, among other aspects of the biology of the group, the relationship between the

Fly feasting: A female *Austrophasma gansbaaiensis* gets to grips with dinner.

Mantophasmatodea continued

South African species and the Namibian species. Work by the team in 2002, when the first joint field expedition was conducted, resulted in a publication describing three new families, five new genera, and nine new species of Heelwalker, bringing the total number of species in the very small order to 12. The specimens collected from a second field trip in 2003 will further add to the known number of Heelwalker species, most of which occur in the Succulent and Nama Karoos, and fynbos biomes.

Set against a universal scenario of shrinking biodiversity, coupled with the increasing extinction rates, the find of a new group of animals so fundamentally different from all other insect groups both surprised and excited biologists, who had assumed that most major animal discoveries had already been made. The apparent centre of distribution of the group in the Succulent Karoo adds yet another biological jewel to the already impressive concentration of endemic plants and insects of this region.

In the UCT zoology department (which celebrated its centenary last year), the numerous Heelwalker cultures that daily consume vast quantities of drozzies (small vinegar flies) will hopefully provide answers to some fundamental questions, such as the evolutionary relationship of the *Mantophasmatodea* to the existing insect orders.

Genetic sequencing of all the known species by the team has produced a phylogenetic tree for the family, bringing an understanding of the evolutionary relationships of the new order with the other insect orders, and of the relationships of the Namibian and South African Heelwalkers with one another.

Scrub scourers: The Mantophasmatodea *search team at Red Stone Hills near Calitzdorp (from left) Koji Tojo, Dr Klaus Klass, Dr Mike Picker and Jakob Damgaard.*

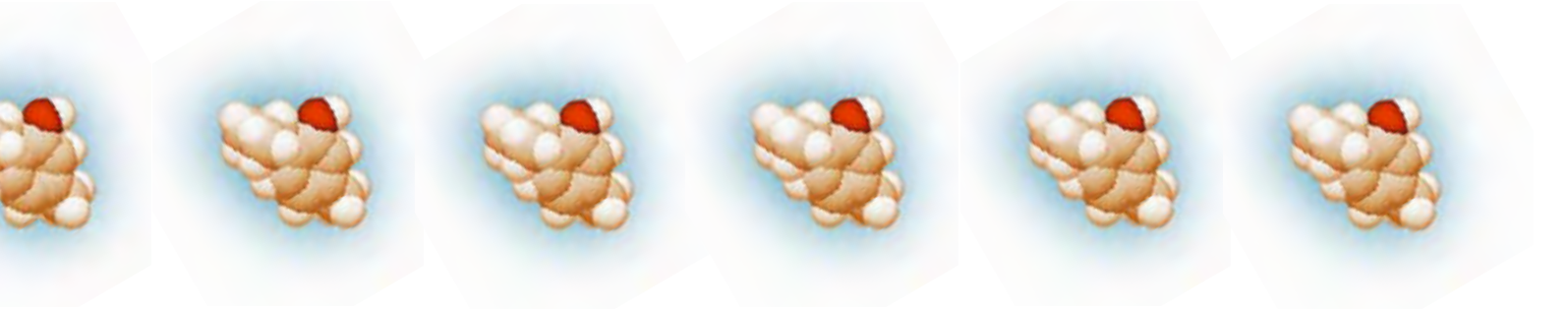
Process cuts thymol production by millions

The South African chemicals industry accounted for R95,8-billion in 2000. Thymol, an ingredient in the manufacture of menthol, is a small portion of this, with a world market of around 4 500 tonnes per annum. However, research at UCT has pioneered a way of reducing the cost of producing thymol by nearly one third, with the potential of adding between R60- and R90-million to South Africa's chemicals industry every year.

"Thymol is essentially a low-volume, high-value 'speciality chemical'," says the Department of Chemical Engineering's Professor Jack Fletcher. "Its main use is as a precursor to menthol, which is in demand in the flavour and fragrance industries."

Traditionally, the production of thymol has left a negative environmental footprint.

Saving money: The Catalysis Research Unit's Prof Jack Fletcher whose postgraduate team investigated ways of producing thymol more efficiently, with fewer by-products.



Thymol continued

Fletcher and a postgraduate research team have been investigating ways of producing thymol more efficiently from a domestic feedstock stream, with fewer resultant by-products and with less impact on the environment. The fact that their process offers significant cost advantages over the traditional route is another benefit.

The request came from the BioChemtek Division of CSIR in response to a request from AECI, the industrial partner. The UCT Catalysis Research Unit has over 20 years of experience in the field of zeolite catalysed chemical synthesis, and was thus the natural choice of "subcontractor" for the research. The result has been a collaborative venture with each party contributing from its own area of expertise. The project, completed in just 12 months, resulted in a new principal conversion process and an optional secondary process for maximum thymol yield.

The principal synthesis step involves converting meta-cresol and propene over a zeolite catalyst. Zeolites are an important class of catalysts. They contain pores of similar size to the molecules involved in the chemical transformations. This allows for selective reactions, since only reactants that can enter the pore can react, only reactions whose transitional states fit into the pore can take place, and only products that are able to diffuse out of the pore will be detected in the products of the process.

The reactions taking place in the pores of zeolites are quite different to the reactions taking place on their external surfaces. Thus the selectivity of the reactions is governed by the geometric constraints of the pore structure.

Fletcher names selectivity as the key descriptor of a catalytic chemical process. "Ideally, you want the selectivity to be 100%," he says. "When you achieve this, it means you are producing only the desired product, without any waste. By treating the external surfaces of the catalytic zeolites with silane compounds, we are able to limit the reactions happening outside the zeolite pores and achieve significantly higher selectivity."

Traditionally, zeolite catalysis has been used to convert aromatic compounds rather than the phenolic compounds that thymol production requires. SA produces large volumes of phenolic compounds as by-products, mostly from its coal-to-synfuels industry but also from the domestic steel industries. The distribution of these phenolic compounds is dictated by the thermodynamics of their formation.

In the steel industry, phenolic compounds are formed at high temperatures and their production exceeds their market demand. Essentially, the process developed by the team at UCT allows for the upgrade of domestically available phenolic substrates such as those derived from SA's coal-to-synfuels industry, to products with a value increased by as much as 300%.

The technology developed by the project team has been purchased by CSIR BioChemtek and is available for commercial implementation and licence.

Born to spend

Anyone who has ever visited one of our country's better known shopping centres on a Friday or Saturday night will be familiar with the sight of hordes of youngsters, dressed in the latest branded apparel, huddling together in groups to organise their hectic social lives on the trendiest cell phones.

It's not surprising that the UCT Unilever Institute of Strategic Marketing chose to devote a study to this group of trendies. After all, they spend over R4-billion a year - and their parents spend an additional R20-billion on them.

The institute's TrendYouth 2 project examines the lives of South Africa's 7- to 17-year olds aiming to gain insights into this broad and complex market in order to signpost the way forward for marketers hoping to reach these young consumers.

According to Professor John Simpson, the institute's director and the recipient of a marketing excellence award from the Marketing Federation of South Africa, this cohort is the most marketing-sussed generation ever.

"They understand brands better than adults and even have the confidence to reject them. Some research indicates that children as young as four are able to recall up to 90 brands. As a group they learn about brands at a very young age, even if these aren't products they've started to use."

Known as the Born Frees, this generation is the largest in South Africa and abroad. Thirty-nine percent of South Africa's population is under the age of 18 (17.3 million children) of which 11 million are aged between seven and 17.

Besides being the largest group in the country, the Born Frees are also influential, colour blind (different cultural and racial groups mix freely, have similar attitudes and aspire to the same products and brands), extremely materialistic and highly techno-literate.

Technology impacts on how these children communicate and their mastery of it increases their confidence. With immediate access to the world 24 hours a day, seven days a week, multi-tasking comes naturally to the Born Frees, who hold interactivity in high regard.

Similarly, this cell phone-crazy generation has ensured that children's use of cell phones has doubled in the last two years. Ninety-five percent of children who have cell phones now communicate via SMS messages, compared to 8% in 2001.

Yet at the same time, these children face intense and varied pressures, which see them growing up faster than previous generations.

"This trend is known as the Kids Getting Older Younger (KGOY) phenomenon and has a particular expression in South Africa," explains Simpson.

"Specific pressures on our kids include AIDS, urbanisation, 'westernisation', crime and violence, not to mention our melting pot of cultures, conspicuous consumption and the presence of very few constructive role models."

Involving over 3 000 face-to-face interviews and 15 qualitative focus groups nationwide, the institute's research shows that while parental role models are influential during children's earlier years, it is their peers and friends who exert more influence as they grow older.

The findings of TrendYouth 2 also show that this is a fast-changing and very complex age group.

As Simpson said: "Far from being a single target group, each sub age group has its own characteristics, rejecting the age group that went before and aspiring to the age group ahead. For example, a 12-year-old will not want to wear what a younger sibling is wearing."

Exponents of responsible marketing, particularly when it comes to such an impressionable and vulnerable group of children, the institute hopes their research will highlight the ethical considerations marketers need to be aware of.

"It is not always in the self interest of marketers to pitch brands to a younger and younger audience," Simpson noted. "In their effort to grow up as fast as possible, these kids tend to reject any brand they associate with a previous age group.

"Furthermore, any breach of effort when marketing to kids will be picked up quickly by parents and could cause long-term damage to the brand. Our study identifies key principles of responsible marketing, which are essential to consider if you are talking to this dynamic but impressionable target group."

AIDS and ethics training for magistrates

"We leave UCT as a group of committed magistrates, rich with information to impart to our colleagues and other officers in our respective offices."

This is a quote from one of the 1 000 South African magistrates trained by UCT's Law, Race and Gender Research Unit (LRG) since 1995.

An independent unit, LRG is primarily engaged in research and training on issues of social context and diversity as they relate to the magistrates' courts.

While working towards the development of a justice system that is responsive to the needs and circumstances of all South Africans, the LRG equips judicial officers with the knowledge and understanding they need to do this, so that their decisions are just and appropriate to our society.

According to LRG director, Professor Christina Murray, one of the most exciting things about working in South Africa is its unpredictability.

"Opportunities that seem remote suddenly become reality, ideas that would be dismissed as idle dreams elsewhere can be implemented, quite unexpectedly, and institutions that seem fixed in their ways change.

"In the past year, the LRG has worked with magistrates from Phalaborwa to Mitchell's Plain, and from Mount Frere to Keimoes, on projects that two or three years back seemed impossible – mere dreams."

Magistrates committed to the LRG's projects have worked with their communities, providing information through talks, drama and pamphlets on domestic violence. They have also engaged with the local police and social services to improve services to women and children that pass through the court system.

"In addition, magistrates have scrutinised their practices in court, resisting old habits and striving to ensure that court procedures and judgements are appropriate to South African society and our new constitutional order," Murray remarked.

But as magistrates are increasingly dealing with cases involving HIV/AIDS and as they have little legal research to tap into, the LRG and the national judicial training college, Justice College, embarked on a substantial project to research issues related to HIV/AIDS.

"Everyday questions that face magistrates have not been tackled, for example the placement of HIV-positive children in foster homes, sentencing HIV-positive people and the impact of AIDS on maintenance issues," Murray noted.

"Our HIV/AIDS programme was prompted by an invitation from the Department of Justice's Directorate on Child and Youth Affairs to run a workshop on HIV/AIDS for Child Commissioners."

Sixty-two magistrates attended the HIV workshops in Gauteng and the Eastern Cape and, as Murray pointed out, their interaction yielded rich and valuable insights into the nature of their problems. These were incorporated into the workshops to ensure that the material was relevant.

Besides their HIV programme, the LRG was also asked to develop a judicial ethics programme.

Murray explained: "Joe Raulinga, now chief magistrate of Polokwane, and a member of the Ethics Committee of the Magistrates' Commission, was persistent in his concern that magistrates are not given adequate training in judicial ethics to enable them to deal with the many difficult situations that regularly confront them.

"Our judicial ethics programme tries

to remedy this by providing a context in which magistrates can reflect on the extraordinary responsibility they carry – as well as the importance of behaving ethically."

With a staff of four full-time professional trainers and three administrators working alongside regular consultants and academics who provide specialised training, the LRG is in an improved position to develop new training material and support magistrates.

"I am confident that we will build on our successes, improve our programmes and respond to change, thus making a contribution to securing democracy in South Africa," Murray ended.

Prof Christina Murray

From Russia with love

"Think of tsunamis," says Russian-born Professor Igor Barashenkov. It's the example the mathematician uses to explain what solitons are: solitary waves that move without breaking up, carrying energy forward at a constant velocity. In the fibre-optic communications industry, billions of solitons per second carry information down fibre circuits in computers, telephones and cable TV. In the modern era, solitons are big business.

His last postgraduate class dispatched, Barashenkov scribbles on the chalk board, his movements quick and decisive. "Solitons are localised bunches of energy which propagate with their shapes and speed unchanged," he explains. "But it was only at the end of the twentieth century that soliton-bearing systems were discovered to have a beautiful and underlying symmetry," he says with some animation.

It was the Scottish scientist John Scott Russell who first studied the solitary wave phenomenon back in 1834. Scott Russell reportedly watched a boat being pulled along a canal by a pair of horses. When it stopped, he noted that the bow wave carried on "at great velocity, assuming the form of a large solitary elevation, a well-defined heap of water which continued its course along the channel apparently without change of form or dimunition of speed".

Scott Russell continued his study of what he dubbed "waves of translation", but the phenomenon made little impact on the scientific fraternity, at least not until the 1960s when digital computers were used to study non-linear wave propagation.

Reports indicate a flurry of activity when it was found that many marvels in physics, electronics and biology could be described by the mathematical and physical theory of the soliton, as Scott Russell's never-ending wave became known.

And it is the mathematics of the soliton that beguiles Barashenkov. "There are several nonlinear partial differential equations that can be solved with the same degree of generality as if they were linear. The method of solution is known as the Inverse Scattering Transform and is regarded by many as the most important discovery in mathematical physics of the twentieth century."

It has certainly spawned new areas of maths and physics, from algebraic geometry to the string theory of elementary particles.

"Entire new branches of mathematics have emerged as a result of this discovery," he confirms, "quantum groups, for example. It's a unique area in the sense that it belongs to both pure and applied mathematics."

But it is in the applied area that the evolution has perhaps been most dramatic.

"Due to their stability and robustness, solitons are ideal carriers of energy and information," Barashenkov expands. "The silent revolution in high-speed optical transmission began several years ago when Alcatel in France, and then Marconi Communications in the UK, started using new systems capable of transmission speeds in excess of 1 000 Gbit/s over thousands of kilometres, eliminating the need for high-cost regeneration of optical signals. These revolutionary systems exploit exactly the solitons, the bell-shaped, self-regulating pulses."

Within the fibre-optic telecommunications networks that crisscross oceans and continents, billions of light pulses per second carry information to the furthest reaches of the globe.

Born in Dubna and a physics graduate of the Moscow University, Barashenkov's academic home these days is in UCT's Department of Mathematics and Applied Mathematics. A scant 11 years after arriving at the Cape of Storms, Barashenkov collected an A-rating from the National Research Foundation for his cutting-edge work in understanding solitons.

What brought him to South Africa? "Between 1989 and 1990 Russia was on the verge of a major economic crisis. By 1991 research funding had become

so scarce that few could afford it," he reflected. "In 1992 I had two offers, one from UCT and another from Montreal. In 1992 Russians were not as materialistic as they are nowadays, so I chose life 'at the frontier'," he quipped.

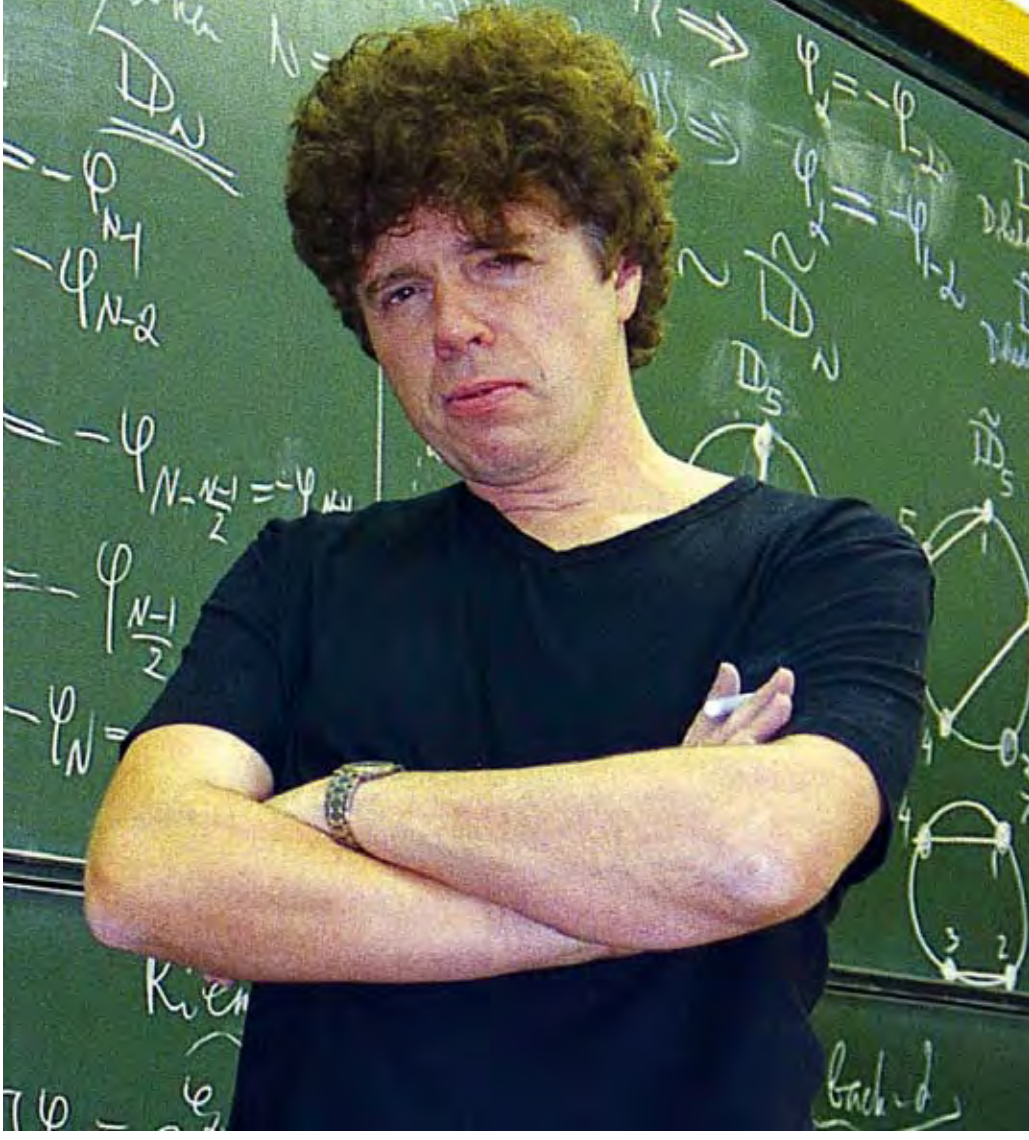
But there were other reasons. "My French was even worse than my English and I was also fed up with ice and snow. I pictured myself living in a bungalow overlooking a palm beach, diving in the lagoon and riding to work on a bike … Anyway, in May 1992 I landed in Cape Town and, although things were slightly different than I expected, I have never regretted it."

While he says his mathematical studies may sound "like ivory tower stuff", the important applied components have significance in Africa.

"Although it would be unrealistic to expect South Africa to become a global competitor in telecommunications any time soon, the research is important due to our strategic position on the continent. The country can't afford not to keep abreast of developments in soliton communications."

He continues: "We should have expertise in, if not producing, then at least maintaining and supporting long-distance fibre-optic networks. There should be some expertise, at least to assess proposed telecommunications projects for Africa, someone who could be consulted on these strategic issues."

Though modest about the A-rating accorded him last year, Barashenkov is passionate about research and counts himself fortunate to work in a faculty where the dean is "a frantic researcher himself".



Research-driven teaching: Prof Igor Barashenkov from the Department of Mathematics and Applied Mathematics explores the mathematics of solitons, the moving wave phenomenon that underpins the field of fibre optics.

"At the moment our department is vigorously discussing whether or not education should be research-driven. I am with those who believe that it should. What can be exciting about a course that is presented simply by re-telling the textbook? What sort of flame, what kind of intrigue does a course like this convey? I am strongly convinced that teaching without research is dead. It's like shooting from a gun without a target, just for the sake of the sound."

Cricket keeps rape researcher sane

Cricket and rape might seem to be at opposite ends of the spectrum when it comes to gender research, but for UCT Research Fellow Dr Helen Moffett, cricket has provided an unexpected (as well as enthralling) platform on which to build her work on the construction of male identity. Cricket is also a perfect foil for her other academic pursuit; her "dark research" on rape.

Moffett provided illuminating glimpses of the making of two documentaries on cricket, *Reverse Swing: Levelling the Playing Fields*, commissioned by Super Sport, produced by Mark Kaplan and screened at the Centre for African Studies.

Cricket might seem a rather startling topic for a gender researcher (Moffett is a Fellow of the African Gender Institute and the Centre for African Studies). It's even more surprising to learn that she was associate producer of the films about this "gentleman's game".

"Cricket," she observes, "reminds me why I like men." She smiles, but it is not a flippant comment. "This is especially important given the very dark research I do on rape."

Gender violence in South Africa provides researchers like herself (both Rape Crisis and the British NGO Womankind use her work for educative and training purposes) with a growing and disturbing archive of material. Moffett claims that cricket, with its emphasis on "noble" moral qualities such as fair play, honour, patience and respect for one's opponent, is one of the things that keeps her sane as she sifts through endless material detailing intimate violence against women and children.

Both films, *Reverse Swing: Levelling the Playing Fields* and *Reverse Swing: Field of Dreams*, were shot during the Pakistan tour of South Africa at the end of 2002 and cover the build up to the 2003 World Cup. "The intention was to use cricket as a barometer to measure South Africa's identity as a nation," she explained.

Kaplan had heard of Moffett's course on cricket and post-colonialism, The Empire Strikes Back. He had put together a treatment for a film series by the same name and invited her to join him as associate producer. "I had no idea I'd be running around cricket grounds all over the country," she laughed.

The footage shifts between contrasting scenes: from dusty rural pitches to state-of-the art grounds like Newlands, from young black rural club players to cricketing greats like Omar Henry and Shaun Pollock. Administrators, commentators, spectators and even ice cream vendors are represented.

Each interview provides a fascinating and often contradictory insight into what cricket represents in this country. There is the rural mother, Lorraine Bonya, washing whites over a plastic tub, the sound of chickens in the background, discussing her plans to form a women's team ("because are no jobs in the Eastern Cape").

And then there is the young captain of the township league team, standing on a pock-marked oval resplendent in his cricket whites, talking of the importance of being a gentleman. Stereotypes are demolished and reinvented, frame after frame. But nothing was staged – and this fascinated Moffett.

"Cricket informs me about empire and colonialism in new and innovative ways. It's the classic example of how former colonies have taken something traditionally imposed and transformed it; think of the way the stellar Pakistani bowlers Wasim Akram and Waqar Younis perfected the technique of reverse swing, where the ball swings in the opposite direction to the one expected."

Cricket, adds Moffett, highlights issues of identity and provides an unexpectedly useful marker of culture, race, class and gender.

A prolific writer in the gender field, Moffett is also working on a book, described as the "definitive cricket coaching manual", with UCT's Professor Tim Noakes and former Proteas coach Bob Woolmer, due out at the end of the year.

On the ball: Gender researcher Dr Helen Moffett. Moffett and producer Mark Kaplan have produced two documentary films on cricket, which she regards as a "handy gauge of our progress as a nation".

Titanium body parts made to order

The X-ray showed a vast area of darkness where the bone of the young man's left upper arm should have been.

A rare bone-wasting disease had savagely rendered his limb ineffectual and confined it to a sling for 18 months.

Enter Drs George Vicatos, UCT mechanical engineering senior lecturer, and Keith Hosking, Vincent Pallotti Hospital surgeon (and part-time at Groote Schuur Hospital), whose unique partnership has ensured that the young man will have a chance at leading a normal life with a fully operational arm.

They achieved this by designing and producing a titanium, Hydroxy-Appatite (H/A) coated prosthesis, including a fully functioning elbow and shoulder joint.

The H/A coating, a coral-like substance, will allow the body to recognise its own material and encourage bone growth onto the prosthesis, creating a more functional limb.

The prosthesis also includes a stem (protruding from the elbow), which links the elbow to the bones in the lower arm.

During a four-hour operation at GSH, Hosking removed what remained of the patient's elbow and shoulder joints and inserted the prosthesis, designed by Vicatos.

According to the doctors, the distinguishing characteristics of this case were not only the rarity of the disease but also their collaboration with United Kingdom orthopaedic prostheses manufacturer BIOMET, the development of a fully functioning elbow joint and the unique H/A coating (completed by BIOMET).

"BIOMET is one of the biggest suppliers of orthopaedic prostheses in the world," Hosking added. "Our designs have now been recognised by a major international company and that's a coup for us."

With only 200 or so reported in medical history, Gorham's Disease (also known as Bone Disappearing Disease) is characterised by bone loss often associated with swelling or abnormal vessel growth.

Normally bones replenish themselves through a cycle of bone dissolution and re-growth. But in people with the disease, bone loss occurs and progresses in certain areas of the body, without new growth taking place. This may occur in one bone or may spread to adjacent areas of the affected bone.

It's a disease that commonly affects the long bones in young adults, usually in their 20s and 30s.

"In this particular case, although benign, the disease was particularly aggressive and involved the entire humerus or upper arm," Hosking said. "With poor results from bone grafting - the disease simply jumps into the new bone - the prosthesis offered a viable alternative."

Vicatos' task of designing and producing the custom-made prosthesis began while he was in Europe. He made sketches from initial X-rays Hosking had sent, and a computer-aided design package allowed him to determine the exact dimensions.

The outcome was a modular design, which would assist Hosking, using simple tools such as a spanner (sterilised of course), to assemble the correct length of the prosthesis inside the operating theatre, outside the patient.

"They are designed to be simple and make the surgeon's job easier," Vicatos added.

As his stock of medical grade titanium was low, the manufacturing process was delayed. But once a new shipment arrived from the UK it took Len Watkins, principal technical officer in the mechanical engineering department, only three weeks to machine the components.

The elbow, shoulder and stem components were then sent to BIOMET to be coated.

In total, the prosthesis cost R40 000. Had the custom-made implants been imported from overseas, the cost would have soared to a staggering R250 000.

"Because these are locally designed and manufactured, the components are far more affordable than the imported

Dr George Vicatos

overseas equivalents, which makes them more accessible to South African patients," Vicatos said.

But this is not their first success story; Hosking, Vicatos and Watkins have already collaborated on 27 similar implants.

Their range of prostheses include a distal radius, a proximal tibia, a proximal femur and a proximal humerus, as well as a complete modular system for the replacement of the femur, or part of it.

Their designs are repeatedly revised, Vicatos explained.

"Some parts are exceptionally difficult to manufacture and others can be standardised and produced in various sizes and options in advance, so patients needn't wait. However, with our new machinery we expect to manufacture some of the components in half a day and with greater precision."

With research and development in this inspiring project ongoing, UCT has allocated space on upper campus for Vicatos and his team (this includes one MSc and two undergraduate students) to set up a research and manufacturing unit.

The unit falls under the umbrella of the Faculty of Engineering and the Built Environment. Appropriately, it is called ISIQU, Xhosa for "complete body".

Wheelchair project rolls out hope

During PhD researcher, Merle Futter's first week of research in Lotus River, a community leader introduced her to the rival gang leaders, a meeting of some significance.

"Members of the Lotus River Community Forum considered this essential for safety reasons as I needed to drive a Kombi loaded with wheelchairs and assistive devices in the area to reach the homes of the physically disabled," said the senior lecturer in physiotherapy.

Four months later two were dead and three were critically injured in a gang fight.

But despite the pervasive sense of violence that hangs like a pall over similar Cape Flats communities, many UCT academics like Futter are notching up startling successes in their community-based projects.

Her PhD research investigates the social barriers that exclude people with physical disabilities from leading full lives within their localities.

Working in these conditions is not new to Futter. She completed her master's degree in Manenburg and has worked so intensively in Lotus River over the past year that she has become an

Helping hand: Merle Futter's community-based project is providing mobility to scores of disabled people.

Futter continued

accepted part of the community.

Futter's aim, born from the foundation of her PhD research, was to get wheelchairs to as many disabled people in this under-resourced community as she could, teach the recipients how to master these and ensure that access was provided to homes in the form of concrete ramps.

Her quest began in October 2002 after she saw the plight of disabled people at the Lotus River Day Hospital.

"I became aware of the magnitude of the problem of mobility and transport and the detrimental affect it had on the quality of their lives. Some had not been able to leave their homes for 12 years," she commented.

Others, who required medical attention for diabetes or hypertension, were unable to attend the clinic. Some who had been issued with walking aids from clinics and hospitals could not use these as their houses were too small.

Her efforts culminated in the recent launch of the Western Cape Physical Disability Project, a collaboration between UCT's physiotherapy division, the Department of Social Services and Poverty Alleviation and AllPay Western Cape (the company that pays out social grants). Generous donations for funding the initial operational costs were also received from the Ackerman Family Educational Trust and the Constantia Rotary Club.

To date 155 wheelchairs have been issued in Lotus River. Crutches, walking sticks and frames, bath boards, grab bars and other functional aids have been given to a further 56 disabled people.

But it is not a case of simply supplying equipment. Futter has visited the homes of each of the community's 88 permanent disability grant-holders to assess their mobility and functional needs. Some lived in third- and fourth-floor flats, others in areas too sandy to propel wheelchairs.

Concrete pathways have thus been built from the front and back doors of 28 homes. Ramps have also been built to provide access to the homes and from the pavements to the roads.

The project has seen previously housebound people take to the streets again in sturdy wheelchairs, built to traverse the rough terrains of sand and rubble that make up many of the community's frequented routes. They haven't just become mobile; they've become visible participants in their communities, able to attend church, shops and clinics. The project has already been extended to other under-resourced communities in the Western Cape. Wheelchairs have been provided to another 250 disabled people from areas as far afield as Wellington, Hopefield, Caledon and Gansbaai. A further 100 requests are being processed from other peri-urban and rural areas in the province.

During a recent visit to the Cape Flats, president Thabo Mbeki handed out 40 wheelchairs at a function in the Mitchell's Plain Community Health Centre as part of the physiotherapy department's outreach programme.

Requests for a further 125 wheelchairs are currently being considered. To date the project has funded equipment to the cost of R700 000.

"As the project has grown too large for one person to assess all the disabled people, physiotherapists, occupational therapists and orthopaedic sisters working at the clinics and hospitals have been invited to refer the mobility needs of those with whom they have contact," Futter added.

But the circle of benefit has widened even further. The company that manufactures the wheelchairs employs disabled people from the community to assemble these, providing employment where few opportunities exist. As a means of employment, the concrete pathways and ramps have been constructed by builders living in the community.

"It's a partnership on many levels," Futter concludes.