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## UP project leads to world's first lion cubs born through artificial insemination

A lioness at the Ukutula Conservation Center (UCC) and Biobank, in South Africa North's West province has given birth to two cubs conceived via non-surgical artificial insemination (AI), using fresh semen collected from an adult male lion at the same facility. These are the first ever lion cubs to be born by means of artificial insemination – the first such pair anywhere in the world.

This achievement is part of a research study by a team of scientists from the University of Pretoria (UP) on the reproductive physiology of the female African lion, and the development of artificial insemination protocols for this species, which

*...continues on page 3.*





# Message from the Dean



*Prof Jean Lubuma  
Dean: Faculty of Natural and Agricultural Sciences*



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The Faculty of Natural and Agricultural Sciences also has a **Facebook page**. Please **like** us.

This has indeed been a year of celebrations for the Faculty of Natural and Agricultural Sciences, with a **science symposium held on the Hatfield Campus to celebrate two decades of FABI** research excellence (page 34).

As always, we have much to boast about concerning the outstanding achievements of our staff members. **Prof Mike Wingfield and Bernard Slippers** (page 23) both from FABI, have been included on the 2018 Web of Science list of the world's most highly cited researchers. **Dr Thulani Makhalanyane** (page 31) from the Department of Biochemistry, Genetics and Microbiology became the first African to join the prestigious board of directors of the International Society of Microbial Ecology. **Dr Chris Oosthuizen** from the Department of Zoology and Entomology won the annual photography competition, Capturing Ecology, of British Ecological Society which celebrates the diversity of ecology around the world (page 42). Other achievements include **Dr Osmond Mlonyeni** from FABI who has recently been appointed to board of directors of The Innovation Hub (page 66) and the official opening of the **renovated Biochemistry laboratories** (page 10) in the Agricultural Sciences Building.

Three female professors were appointed as heads of department (HODs) in the past

few months, bringing the percentage of female HODs to just more than 60 per cent of the departmental heads. **Prof Serena Coetzee** was appointed as Head of the Department of Geography, Geoinformatics and Meteorology (page 67), **Prof Sheryl Hendriks** as Head of the Department of Agricultural Economic, Extension and Rural Development (page 69) while **Prof Armanda Bastos** became the Head of the Department of Zoology and Entomology (page 68).

Through multidisciplinary research, as well as teaching and learning endeavours in the Faculty, we aim to make a difference in the world. A lioness at the Ukutula Conservation Center and Biobank, **has given birth to two cubs conceived via non-surgical artificial insemination (AI)**, using fresh semen collected from an adult male lion at the same facility. These are the first ever lion cubs to be born by means of artificial insemination—the first such pair anywhere in the world. This achievement is part of a research study by a team of scientists from UP on the reproductive physiology of the female African lion, and the development of artificial insemination protocols for this species (page 1).

Our students also made us proud. **Bernard Smit**, a final-year microbiology student recently published an article in the international journal *Letters in Applied Microbiology*, on a novel method to generate electricity using an interesting type of bacteria and also had a planet named after him (page 4). **Zak Claasen**, a blind student completed a BSc in Genetics with distinction (page 13).

Many more outstanding achievements by our staff, students and affiliates can be cited, and we are very proud of all of them. With this newsletter, we aim to showcase some of these achievements and hope that you will enjoy this update on the latest developments in the Faculty.

We wish you all well for the coming festive season and trust that you will return refreshed in 2019.

**Prof Jean Lubuma**

**Dean: Faculty of Natural and Agricultural Sciences**





*One of the newborn cubs*

*...continued from page 1.*

could be used as a baseline for other endangered large wild felids.

Although African lions normally breed quite well in captivity, the wild population is highly fragmented and suffers progressively from isolation and inbreeding. Indiscriminate killing and prosecution, habitat loss and prey depletion, epidemic diseases, poaching, and trophy hunting threaten the extinction of these existing wild populations. The African lion population is estimated to have decreased from 1,2 million individuals in 1800 to about 25 000 in 2016, and 18 000 in 2018. This is a decrease of more than 98% over 220 years, with a decline in numbers of more than 60% just over the past 25 years.

The African lion is listed as 'Vulnerable' on the International Union for Conservation of Nature (IUCN) Red List of Threatened Species, with the West African lion subpopulation considered critically endangered, while the Asiatic lion is also considered endangered in the wild.

According to Dr Isabel Callealta, a qualified veterinarian from Spain and PhD candidate under supervision of Prof André Ganswindt, Director of the University of Pretoria's Mammal Research Institute,

the team now has novel data for the African lion's reproduction physiology. "This, together with the success of the AI births of the lion cubs, not only celebrate a world-first achievement, but has laid the foundation for effective non-surgical AI protocols for this species, using both fresh and frozen-thawed sperm."

According to the researchers, the application of these new techniques could provide a faster and broader diversification and distribution of the genetics, and a reduction of disease transmission, as well as, of course, independence from animal translocation for breeding purposes.

The owner of Ukutula and founder of the UCC & Biobank, Mr Willi Jacobs, said he is honoured to have been able to provide an advanced scientific facility as well as the required animals for this exciting research project. "We are grateful to the team of scientists who continue working relentlessly in pursuit of this key element in preserving future generations. There can be little doubt that wildlife conservation through education and ethical scientific research is the most suitable long-term solution for our planet's conservation challenges and dwindling wildlife populations."

*Photo credit: Willi Jacobs*





# Bright student has a planet named after him

**How many people can say they have had a planet that has been named after them and that they have published internationally, all before reaching the age of 21?**

Bernard Smit, a final-year microbiology student at the University of Pretoria (UP), recently published an article in the international journal *Letters in Applied Microbiology*, on a novel method to generate electricity using an interesting type of bacteria.\*

'I have been interested in science since a young age and am very curious about how things work. I want to know how science is evolving to improve our understanding of the things around us – and I love robotics,' Bernard explained. 'Science is exciting as it is the creation of new knowledge. The innovative application of this knowledge to solve world-wide problems keeps my clock ticking.'

The process of generating electricity using bacteria was discovered many years ago. Bernard started playing with this idea in Grade 9, and in Grade 10 he entered a project in a science expo at Hoërskool Waterkloof. In Grade 11 he tested his hypothesis, enlisting the help of UP researchers Prof Fanus Venter, Prof Johan Joubert, Dr Elritha van Zyl (all from the Department of Microbiology) and Prof Walter Meyer (from the Department of Physics). This work earned him a gold medal at the Eskom Expo for Young Scientists International Science Fair, where he was also a category winner.

In 2015, when he was in matric, he had the opportunity to perform electron microscopy at UP and participated in the Intel International Science and Engineering Fair (Intel ISEF) in Pittsburgh, USA, where he received a silver medal and special prizes from the American Society for Microbiology and the Chinese Department of Science and Technology. Among these was the honour of having a minor planet named after him.

That same year Bernard was invited to shadow Dr Christopher Lefèvre during his visit to the University of the Western Cape. Dr Lefèvre then invited Bernard to perform further testing at the Alternative Energies and Atomic Energy Commission (CEA) in Aix-en-Provence, France. During his first year at UP, Bernard finished his experiments and received the Derek Gray Memorial Award, which afforded him the opportunity to present his research at the Stockholm International Youth Science Seminar (SIYSS). The SIYSS took place during Nobel



*Bernard Smit*

Week, and the 25 participants from around the world attended activities such as the Nobel Lecture Presentations, the Nobel Prize Award Ceremony and the Nobel Banquet. After one more year of writing up, his article was accepted and published.

Bernard is grateful to all the people that have crossed his path and feels everyone has made a valuable contribution, especially those who were willing to make suggestions and answer questions. 'I feel extremely privileged and proud to be an undergraduate student at UP,' he concluded.

In addition to his academic activities, Bernard also played trombone for the UP Symphony Orchestra and Wind Band and enjoys hiking.

\* *The bacteria used in the experiments, called Magnetotactic Bacteria, are extraordinary as they possess very small magnets (called magnetosomes) which they use to obtain optimal growth conditions in water by using Earth's magnetic field. Bernard has allowed these bacteria to move through coils, using Faraday's law of electromagnetic induction to generate electricity. This could be a potential alternative energy source or it might have an interesting microvoltage application.*



# Collaboration key to success in science

‘Science is not a solitary journey and collaborations should start from as early as possible.’ These are the wise words of a PhD student in Medicinal Plant Science in the Department of Plant and Soil Sciences, Carel Oosthuizen, who was recently awarded the Gauteng Biotech Fundi Postgraduate Award.

The award ceremony took place at the annual Biofundi event hosted by Gauteng Department of Agriculture and Rural Development (GDARD) and The Innovation HUB in recognition of academic excellence and the most innovative project idea. The award is given to a student, ideally postgraduate, who is involved in or conducting a project that has the potential to become a commercialised innovation in the biotechnology sector.

Carel was selected for the award for the progress and innovation made possible by his PhD project. He has succeeded in identifying new natural products to target tuberculosis (TB) biofilms, a very important step towards the latent treatment of TB infections. This project is a combination of phytomedicine and phytochemistry approaches together with computational biology. Through computer-aided simulations, Carel can precisely describe how and why his compounds act the way they do, and possibly lead to the improvement and optimisation of this group of natural compounds as new biofilm quorum quenching molecules.

He was invited to complete part of his postgraduate studies on biofilms and their mechanism at the University of East Anglia in England and the University of Albany in the USA through a bilateral programme with the Royal Society and the Innovation Doctoral Scholarship which he received from the National Research Foundation.

Carel has presented his research at three international and four national conferences, where it has sparked great interest. He has published four peer-reviewed articles in top scientific journals and three chapters in books on the use of plants for the treatment of

tuberculosis. Together with his supervisor, Prof Namrita Lall, he holds a South African and international patent for the use of a plant extract as an adjuvant treatment for patients suffering from TB.

Commenting on his achievement, an elated Carel said, ‘It is a great honour and privilege to receive this award. But, it would not have been achievable without the assistance and support of so many people. Supervisors and co-supervisors, fellow postgraduate students, faculty and staff of the Department of Plant and Soil Sciences, family and friends, mentors from different countries and institutions and even reviewers, they all played a big role in the completion of my project.’

He concluded by saying, ‘When you are curious about science and somebody tells you that curiosity killed the cat, remember that the last part of the quote is “but, satisfaction brought it back to life.”’

In 2017 Carel also received the prize for the best paper at the annual conference of the Indigenous Plant Usage Forum (IPUF). The title of his paper was ‘Natural coumarins against persistent mycobacterial biofilms’.

*Mr Carel Oosthuizen*





# Hot birds in the hot seat

**Prof Andrew McKechnie of the Department of Zoology and Entomology was recently awarded the South African Research Chair in Conservation Physiology. The Chair is hosted by the National Zoological Gardens of South Africa and co-hosted by the University of Pretoria (UP).**

The Chair will expand on the innovative research in which Prof McKechnie has been involved over the past decade: focusing on conservation physiology and mechanistic approaches to modelling animals' responses to climate change. He has been a principal investigator in the Hot Birds Research Project, a collaboration between UP and the Percy FitzPatrick Institute, University of Cape Town, since its inception in 2009. The project examines the behaviour and physiology of desert birds to understand and predict their responses to climate change.

There is no denying that climate change is ongoing and that the effects are significant. Deserts across the world are heating up drastically and becoming even harsher environments than they have been in the past. This is a good reason to study these environments and, as a wild bird specialist, Prof McKechnie says deserts are the hottest areas wild birds are currently experiencing. Arid environments thus serve as good model systems for understanding the impacts of climate change on animals.

One of his current projects, for example, is looking at the adaptability to rising temperatures of the threatened Red Lark, which is endemic

to the Northern Cape. This research is showing that when birds experience multiple hot days in succession, they progressively lose body mass because their foraging efficiency is lowered as a result of the extreme heat. What makes their survival even more precarious is that the extreme heat seems to be affecting their breeding success since there is little evidence of juvenile birds in the area. Prof McKechnie reflects on their breeding patterns with concern: 'I am beginning to wonder if these larks have bred at all in the last three years.'

Apart from being able to expand current research areas, the Chair enables research in areas previously unexplored to be realised. This not only brings great excitement to Prof McKechnie, but also allows for a better understanding of the effects of climate change and how, inevitably, we are all going to be affected by it.

One such idea he is developing involves an expansion of his research into poultry science to investigate how small-scale, subsistence poultry production systems are affected by rising temperatures. In areas like the Limpopo Valley and the Lowveld of South Africa, summer temperatures regularly reach 40° C, which poses a threat







*Prof Andrew McKechnie*

to rural communities raising chickens as a critical source of protein. Global warming can may reduce the reliability of this protein food source, with potentially dire implications for food security.

Research such as this also opens the doors of opportunity for interdisciplinary research by delving into areas other than climate change and conservation physiology, for example the alleviation of poverty and subsistence farming, in response to the social and economic challenges facing the country.

Prof McKechnie is also interested in extending his research from very arid zones to mesic areas, where high humidity can constrain birds' capacity to lose heat in hot weather. This could potentially extend research to areas beyond the dry Northern Cape to as far as the northern parts of KwaZulu-Natal. In areas like Kosi Bay, humidity is likely to be an overwhelming factor in affecting birds' responses to higher temperatures. Unlike in dry areas such as the scorching Kalahari where birds can readily lose heat through evaporation, this

may not be an option in areas of high humidity.

Aiding his research is the new UP Small Animal Physiological Research Facility, which offers the perfect setting for Prof McKechnie's work on thermal acclimatisation in birds and other animals. He hopes to establish long-term breeding colonies in this facility to find answers to questions related to phenotypic flexibility, genotypic adaptation and epigenetics. He also plans to incorporate approaches that are more mechanistic and based on an understanding of functional links between organismal physiological tolerances and environmental variables.

This SARCHI Chair enables him to be involved in cutting-edge research in conservation physiology and puts him at the forefront of predicting how wildlife will respond to climate change. 'I am firmly on a good research track, which is where my heart is,' says Prof McKechnie. One can just wait in anticipation to see what he will do next.



# Double recognition for FABI's Dr Irene Barnes

Dr Irene Barnes, from the Forestry and Agricultural Biotechnology Institute (FABI), has been awarded the internationally acclaimed 2018 Ethel Mary Doidge Medal for outstanding early career research in mycology.

Dr Barnes doubled up by being named first runner-up in the Distinguished Young Women Researchers category of the Department of Science and Technology's (DST) South African Women in Science Awards. These awards celebrate and reward distinguished female researchers in South Africa. Since 2003 the DST has, in recognition of Women's Month, emphasised the importance of education for young girls especially, and encourages attendees to be role models to youngsters interested in following careers in the Science, Technology, Engineering and Mathematics fields.

The Africa-wide award Dr Barnes received is named after the famous plant pathologist Ethel Doidge (1887-1965), who was the first female to receive a doctorate in South Africa. It is awarded by the International Mycological Association, which recognises one young mycologist from each of the five continents for exceptional research accomplishments relating to the study of fungi. These awards are named after famous mycologists from the five continents, and are presented once every five years. The award winners were announced at the opening ceremony of the International Mycological Congress in San Juan, Puerto Rico.

Dr Barnes is a high achiever: in 2015 she received the Exceptional Young Achievers Award from UP, and she has received numerous grants to attend international conferences. She was recognised as the best microbiology honours student in her year at UP, and received the Southern Africa Association for the Advancement of Science Award for her master's thesis, which was judged the best among her peers. She was also awarded a Claude Leon Foundation postdoctoral fellowship.



*Dr Irene Barnes*

Dr Barnes has a National Research Foundation Y1 rating, has published 63 papers in international peer-reviewed journals, and is on the review panel of 14 ISI-rated journals. Her research, which focuses mainly on the taxonomy, phylogenetics and population biology of fungal pathogens that infect forest trees, has resulted in her presenting her findings and delivering keynote lectures locally and internationally. Her research also includes describing new fungal species, determining the biodiversity of fungi in plantations, and uses population genetic approaches to trace the origins and infection pathways of some of the world's most serious agricultural and forest pathogens.

She says, "I knew I wanted to be a microbiologist ever since my biology teacher at Pretoria High School for Girls allowed me to take a microscope home for my Grade 8 science project. I spent many hours discovering the fascinating world of microbes from the waters of Magnolia Dell. Going to FABI to do my postgraduate studies was an obvious choice."

Dr Barnes says she's "incredibly honoured to have received these awards in recognition of the work I do, and particularly to promote the fields of Forest Pathology and Mycology. My colleagues and collaborators have been the catalyst in my success and I hope, going forward, that I too can 'pay it forward' and be an inspiration and role model for younger researchers pursuing a career in science."

She successfully supervised two doctoral, seven master's and 11 honours students. She is now supervising nine doctoral and five master's students.





Prof Christian Pirk

# Prof Christian Pirk rated among top reviewers internationally

**Prof Christian Pirk, Head of the Social Insects Research Group in the Department of Zoology and Entomology at the University of Pretoria (UP), was recently named a top reviewer in Publons' global Peer Review Awards after having been placed among the top 1% of reviewers in Plant and Animal Science internationally.**

Publons' global Peer Review Awards celebrate the #SentinelsofScience and research, honouring the critical role played by peer reviewers in ensuring the quality and integrity of published research.

According to Prof Pirk, 'by playing an active role in the peer review process in which the outputs of scholarly research are evaluated, and by being recognised for it, I aim to lead by example and motivate my students to read and critically evaluate what is presented to them as scholarly articles, news stories, political statements and information, and their sources in general.'

He explained: 'Any form of teaching has the purpose to not only transfer knowledge, but to also convey to learners and students a skills set that enables them to evaluate complex issues and critically evaluate them, thereby equipping the new generation to make informed decisions and be active, critical members of society. In the light of "fake news" in general and publishers that are more interested in the "article-processing costs" than in the quality of

research, it becomes more and more important to identify fact from fiction and bad science from good science.'

Prof Pirk was born in Berlin, Germany, and studied Biology and Mathematics at the Berlin Technical University before completing his PhD at Rhodes University. His research focuses on the behavioural and chemical ecology of social insects, in particular honeybees. He is involved in international networks with an interest in pollinator and honeybee health and collaborates with colleagues in Europe, Asia, America and Africa, and provides a base for students interested in behaviour, chemical ecology, mathematical modelling, nutrition and social insects. He is a member of the South African Academy of Science and of several international networks, and serves on the editorial boards of the *Journal of Insect Behaviour* and *Scientific Reports*.

He received a C1 rating from the National Research Foundation and is also ranked among the top 50 behavioural ecologists in Germany, based on online citations. In 2012, he received a UP Exceptional Young Achiever award.

Publons' Peer Review Awards honour the elite contributors to scholarly peer review and editorial pursuits internationally. Recipients have demonstrated an outstanding expert commitment to protecting the integrity and accuracy of published research in their various fields.

# State-of-the-art biomolecular laboratories create opportunities for collaboration

**"These world-class laboratories will allow us to consolidate and grow our research base in the newly consolidated Department of Biochemistry, Genetics and Microbiology under Prof Paulette Bloomer." These sentiments were shared in March this year by the Vice-Chancellor and Principal, Prof Cheryl de la Rey at the official opening of the new Biochemistry laboratories in the Agricultural Sciences Building in the Faculty of Natural and Agricultural Sciences.**

According to Prof De la Rey, these cutting-edge laboratories, renovated at a cost of R8.7 million, will further improve our high impact research and will inspire a new generation of scientists.

Prof Stephanie Burton, Vice-Principal: Research and Postgraduate Education emphasised that these laboratories will drive new cross-disciplinary fields of research. "Molecular and structural biology are central to the three disciplines of Biochemistry, Genetics and Microbiology and will harness the power of 21<sup>st</sup> century technologies. It will be a research hub," she concluded.

"The research to be undertaken in these laboratories on African and South African diseases, align well with the University goals of being a research intensive university. So much more so, with Future Africa, built at a cost of R250 million, in close proximity. It will enable a new generation of African scientists to develop into leading researchers."

Prof Jan Verschoor, a former Head of the Department of Biochemistry, reminisced about the 77-year history of Biochemistry

at the University of Pretoria and how the department focussed its research on molecular aspects of poverty-related diseases, such as TB, Malaria and HIV/AIDS.

Prof Wolf-Dieter Schubert, the Head of Division of Research and Postgraduate Studies in the new department summarised the planning and the year-long renovation process in a pictorial presentation.

Prof Paulette Bloomer concluded that the new laboratories provide a wonderful opportunity for Biochemistry, Genetics and Microbiology to expand its know-how and capacity. "This renovation is an example how research facilities dating back to the 1960s can be brought into the 21<sup>st</sup> century. It should serve as a model for the other floors of the Agricultural Sciences Building."

The event was ended on a high note with a ribbon cutting ceremony and a tour of the newly renovated facilities, followed by light refreshments.

**From left:** Prof Wolf-Dieter Schubert (Head of Division of Research and Postgraduate Studies), Prof Cheryl de la Rey (Vice-Chancellor and Principal), Prof Stephanie Burton (Vice-Rector: Research and Postgraduate Education) and Prof Jean Lubuma (Dean: Faculty of Natural and Agricultural Sciences).





# Consumer specialist Ina Wilken (72) receives master's degree

**Ms Ina Wilken (72), a consumer specialist and advisor, received a master's degree in Consumer Sciences from the University of Pretoria this year, under the supervision of Dr Suné Donoghue and co-supervision of Prof Johan Kirsten.**

Ms Wilken is committed to uplifting consumers and advocating for their rights and dedicates many hours to this noble cause. She has been closely involved with the South African National Consumer Union since 1996, and was the chairperson for two full terms – 1998-2001, 2005-2008, and also during 2016-2017. She was vice-chairperson of the National Consumer Forum in 2010. Her involvement in consumerism started at the SA National Consumer Council (1989-1996), where she left as director when the Department of Trade and Industry shut it down.

“Assisting consumers and being their spokesperson for many years has become a passion,” she says. “There are far too many people who do not know their rights as consumers and are also unaware of their responsibilities. The opportunity to further my studies in this direction dawned on me when I stepped down from my day to day work at the office and started working from home.”

“The aim of my study was to make consumers aware of the importance of a label on a product and how vital it is to understand what the wording implies,” she says. “This was a long, wonderful, insightful journey which, should I turn the clock back, I would do again against all odds. This degree made me realise that there is so much more to learn, and that we should never stop learning and never stop living our lives in full. All this is due to the Grace of God.”

Ms Wilken did both her BCom and BCom honours (Business Economics) degrees at UNISA. She was on the executive of Finbond Mutual Bank from 2003 to 2013, and still serves as a non-executive director. She often acts as keynote speaker at functions, workshops and seminars. In 2007 she was invited to address the annual congress of Consumers International in Sydney, Australia, as keynote speaker. She was named the DTI's Individual Consumer Champion in 2005, and was the runner-up for the same award in 2007. In 2011 she was honoured with the South African Women's Agricultural Union (SAWAU) charter as patron of the 80-year-old body.



*Ms Ina Wilken*

She has served on many other South African bodies, including:

- Pretoria Chamber of Commerce and Industry (Vice-President)
- Banking Ombudsman (Vice chairperson)
- SABS Consumer Sector Board (Chairperson)
- Debt Collectors Council (Vice chairperson)
- Cotton Boards of South Africa (Director)
- Agricultural Produce Agents Council (Director)



# Danielle Twilley won L’Oreal–Unesco Women in Science Award

**A young medicinal plant scientist from the University of Pretoria (UP), Danielle Twilley, won international recognition for her contribution to science, with her research on the use of indigenous plants to treat cancer. The organisers of the L’Oréal-Unesco Women in Science Awards named Twilley as one of 15 ‘Rising Talent’ researchers at a reception in Paris, France earlier this year.**

One in every three cancers diagnosed is a form of skin cancer. Melanoma is a type of skin cancer and is the most dangerous. Sun exposure is the main attributing factor of melanoma, with 65-86% of melanoma cases being attributed to sun exposure. The risk of developing melanoma can double after more than five sunburns. The fact that the ozone layer is constantly depleting, further accounts for the large number of melanoma cases across the world.

Melanoma is an exceptionally dangerous type of cancer because it has the ability to spread into other parts of the body, making it difficult to control and treat. Melanoma cells, like any cells in the

body, need to get the necessary nutrients and oxygen in order to grow. If they are deprived of oxygen, they become hypoxic. To prevent this, melanoma cells give off signals known as vascular endothelial growth factor (VEGF) which is a type of protein that stimulates the formation of new blood vessels around the tumour cells. The formation of new blood vessels is known as angiogenesis. These blood vessels feed the cells and provide them with pathways to various parts of the body, allowing the cancer to spread.

Treating melanoma should therefore either inhibit angiogenesis so that the cancerous cells will starve or treatment should directly target the cancerous cells. There are currently no angiogenesis inhibitors for melanoma and because of the high density of blood vessels typically surrounding melanoma cells, the ability for cytotoxic drugs (drugs that are toxic to cells) to effectively enter the cancer cells is restricted.

Danielle Twilley of the Department of Plant and Soil Sciences wants to change this and is finding new ways to inhibit both angiogenesis and tumour growth in melanoma cells. Twilley is looking to traditional

indigenous South African plants to find solutions. Previously, Twilley had discovered a South African plant that had significant cytotoxicity (toxic to cells) towards melanoma cells.

Her current research takes things further and looks at isolated compounds and extracts from the plant to see if they are able to inhibit the VEGF (signals sent out by the tumour cells) so that angiogenesis is inhibited. The importance of this research could be a game changer in the field of melanoma treatment. Her research has reached a very exciting phase, with both the compound and extract of the plant showing positive signs of inhibiting angiogenesis. “The pure compound appears to be able to kill the cancer cells at a much lower concentration,” explains Twilley.

While cancer treatment can be very unpleasant in terms of side effects, Twilley is also delving into the field of nanoparticles in her development of an anti-angiogenic agent in order to

*Danielle Twilley*





minimise any damage of healthy cells. Nanoparticles have certain advantages over conventional drugs in that more powerful doses can be delivered to the area of the tumour and its vascular network that needs to be targeted. Because this is a very targeted form of therapy, the treatment agent is less likely to affect healthy cells. "Nanoparticles also tend to deliver deeper into the vascular system surrounding the melanoma cells," explains Twilley.

Twilley's research has already shown successful results in the in vitro phase. She will continue to look at the in vivo phase to see if positive results are found.

This phenomenal indigenous plant that is likely to change the treatment of melanoma is commonly found in South Africa and has been used in traditional medicine for years to treat skin ailments. Twilley and University of Pretoria are busy applying for a bioprospecting permit so that UP can licence the plant out to manufacturing companies who can then develop topical treatments from the plant. Through this project, Twilley also aims to have local communities' benefit. There is great potential to create a local market for community farmers who can grow these plants. This can create jobs and develop the socio-economic aspects of communities in South Africa.

Twilley's research is regarded so innovative and exceptional that she was awarded with the 2018 L'Oréal-UNESCO Women in Science International Rising Talents award. These awards stem out of the L'Oréal-UNESCO For Women in Science initiative that strives to support and recognise accomplished women researchers, to encourage more young women to enter the profession and to assist them once their careers are in progress. The Women in Science International Rising Talents award is given to the 15 best worldwide fellows from the national and regional For Women in Science programmes. Twilley was awarded the L'Oréal-UNESCO Women in Science sub-Saharan regional doctoral fellowship in 2015.

As part of this year's award, Twilley spent a week in France where she not only presented her research to an international audience of scientists, but also received training in business, media and training on patents.

Twilley's research to develop a proudly South African melanoma lead plant extract and compound has the potential to increase the global competitiveness of South Africa as leaders in alternative methods for treatment of serious diseases like cancer. This research also has the potential to change the lives of so many people suffering from melanoma.



Zak Claasen

## Against the odds

**Zak Claasen studied in the University of Pretoria's Faculty of Natural and Agricultural Sciences and has completed a BSc in Genetics with distinction.**

This is an extraordinary feat for any student, but even more so because Zak is blind. Unable to see all the visual material required for his degree, Zak had to rely on his screen reader software, descriptions from textbooks and digital scans and printouts in braille from UP's Disability Unit. The library also played a role in Zak's success by ensuring that his textbooks were ordered in electronic format to allow him to read it through his screen reader.

Zak is currently registered for an honours in bioinformatics and intends to complete a master's degree as well. Zak chose to study genetics because "the genetic code underlies the functioning of every living thing on the planet. I chose to study it because it seemed very interesting when I was doing it in Life Science at school, and because it's a relatively new field that's still growing as new discoveries are being made. And I think it has the potential to become more important in future."

Zak's message to fellow students is: "Don't give up! If you don't succeed, keep trying, you will eventually." Zak makes special mention of the [Disability Unit](#), the [Department of Library Services](#) and the departmental tutors who helped him on his way to success.

# Going with the flow in pharmaceutical manufacturing

**Nicole Neyt, a PhD student in the Riley Research Group housed in the Department of Chemistry, recently won the first prize in the Royal Society of Chemistry (RSC)'s Twitter poster conference (the world's biggest poster conference with over 1 900 posters displayed) in the category of engineering for her work in flow chemistry.**

This follows after she published her efforts in the development of a hybrid batch-flow process route to the anti-psychotic drug clozapine used for the treatment of schizophrenia and Parkinson's disease.

Nicole works at the interface of chemistry and engineering looking at the development of new flow reactor technologies and the implementation of these technologies in the total synthesis of active pharmaceutical ingredients. Her work on the clozapine process

involved the development of a route that encompasses the use of the best of both traditional batch- and new flow technologies and the integration of these approaches. She was able to demonstrate a complete integrated synthesis of clozapine improving the current batch process yield from 27% to 45%, while reducing the production time from 132 hours to 44 hours. Remarkably, the synthetic route, which comprises four different reactions, was conducted as a single continuous process with all reactions, downstream processing and purification performed in-line.

She has also been selected for the cover of the February 2018 issue of the Royal Society of Chemistry (RSC) publication *Reaction Chemistry and Engineering* (*React. Chem. Eng.*, 2018, **3**, 17-24). In addition, she was awarded a second prize for a talk she gave at the 2017 SACI Young Chemists Symposium as well as a second prize for a poster presentation at the Flow Chemistry Europe 2018 conference in Cambridge, UK.

*Dr Hugh Cowley, Development Editor: Royal Society of Chemistry and Nicole Neyt*

Synthetic organic chemistry is currently undergoing an evolution from batch-based syntheses to continuous flow-based syntheses wherein chemical transformations are conducted in continual flowing streams in tubular and micro-reactors using state-of-the-art flow reactor technology. The disruptive nature of flow technologies affords improved productivities, continuous production, increased safety and greener processes, and is set to change the face of pharmaceutical manufacturing. Locally the Riley Research Group is exploring the use of flow technology as a tool to feed into and afford a competitive advantage in an emerging local pharmaceutical manufacturing industry.

The group has to date developed flow-based process routes to several key active pharmaceutical ingredients in collaboration with industry partner Pelchem with the ultimate goal of commercialising these routes to allow local economic and competitive manufacturing.







*Pheladi Venda Tlhatlha receives her award certificate from Georg Schütte, German State Secretary at the Federal Ministry of Education and Research.*

## Master's student scoop prestigious Green Talents award in Germany

Pheladi Venda Tlhatlha, a second-year Environmental Management master's student in the Department of Geography, Geoinformatics and Meteorology has received a prestigious annual award from the German Federal Ministry of Education and Research for her participation in the Green Talents International Forum for High Potentials in Sustainable Development, which promotes the international exchange of innovative environmental ideas.

The award honours young researchers and recognises them for their outstanding achievements in making societies more sustainable. Nominated by a jury of German experts, Tlhatlha was among 25 candidates who received the accolade, all of whom were selected out of 736 applicants worldwide. The winners were drawn from various scientific disciplines and are granted access to Germany's research elite. She attended a two-week science forum in Germany, during October which took her to various hotspots of sustainability science in the country.

"I feel privileged to have been selected as a Green Talent," says Tlhatlha, "It's an incredible opportunity to engage and gain more knowledge about sustainability science in Germany, and all over the world, from interactions with other participants."

Her research explores the challenges of energy poverty and household energy use patterns in informal settlements in South Africa, and seeks to find renewable energy technologies and implementation strategies that can be retrofitted into new and existing technology

in order to alleviate poverty in these areas. "I chose this discipline because environmental management is a fundamental component of sustaining all types of life. It also has a strong interdisciplinary approach to addressing various sustainability challenges. As an environmental scientist, I'm able to integrate environmental, social and economic aspects into my research and work."

The forum's jury acknowledged the relevance of Tlhatlha's research to Germany. "One of the key factors of sustainable development is collaboration and innovation. Although access to energy in Germany is rather different to the situation in South Africa, the exchange of research and knowledge will be of benefit to energy conservation efforts in both countries," the jury stated.

"The Green Talents network is comprised of scientists who focus on various topics such as climate change, biofuels, nanotechnology and water quality, which can allow for future collaborations between different research areas and across different countries," Tlhatlha adds. "This will also allow me to become a better researcher in my field due to exposure to terrific institutions in Germany."

She is considering either enrolling for her PhD next year or establishing a project that promotes environmental education and sustainability science in the primary and high school curriculum, with a strong emphasis on encouraging skills development and training for young prospective scientists.



Mr Renaan Thompson

## Prestigious award inspires Renaan to achieve more

"Receiving this award has tremendous significance by not only motivating me to keep pushing and doing better, but also proving to myself that I can achieve more than what I deem possible. This is the first award of such calibre that I received."

Mr Renaan Shane Thompson, a PhD (Plant Pathology) student at the University of Pretoria (UP), was recently awarded the African Mycological Association (AMA) award for the Best Oral Presentation by a student at the 44<sup>th</sup> South African Association of Botanist (SAAB) congress held at UP.

The title of his presentation was 'Seed-borne *Sydowia polyspora* isolated from pine (*Pinus* species) seed within South Africa'. He is supervised by Prof Theresa Aveling (Plant Pathology, UP), with Dr Merwyn Beukes (Biochemistry, UP) and Prof Guro Brodel (Fungal seed pathology, NIBIO, Norway) as his co-supervisors.

Renaan's PhD, titled 'Prevalence, isolation and characterization of *Sydowia polyspora* from pine (*Pinus* spp.) in South Africa' and his research has thus far shown that the fungus is pathogenic on seedlings of three of the most cultivated species in the country.

This is the first report of the fungus being isolated from pine within Africa and his findings have been submitted for publication and he is currently in the process of submitting his second publication.

He started his tertiary education in the Department of Plant Pathology (now part of the Department of Plant and Soil Sciences) at UP in 2004 and completed his undergraduate, honours and master's degree at the University. His commitment to his studies is prevalent being a Golden Key student up to honours level.

Renaan's honours and master's degree was focused on developing a method to test for four *Fusarium* species from maize. "I have published the work in the *South African Journal of Botany* and the method is in the process of being submitted to the International Seed Testing Association (ISTA), where upon validation and acceptance, will be used to test for the fungi wherever maize is imported or exported," he explains.

Renaan is the First Technical Assistant in the Plant Pathology division and responsible for all the practical coordination up to honours level amongst other duties.



A close-up portrait of a woman with long, dark, wavy hair, smiling gently at the camera. She is wearing a dark top. The background is softly blurred, showing what appears to be a window with light coming through.

*Ms Leticia Brown*

## Australian volunteer has praise for Sci-Enza

**'Having the opportunity to collaborate with Sci-Enza's team and observe the Centre's community outreach programme has been a fulfilling experience,' says Leticia Brown, a communications and media consultant in the Australian government's Volunteer Program.**

Leticia has been sharing her marketing and communications experience with the team at Sci-Enza, the University of Pretoria's Science Centre, for a few months this year.

'With an interest in international development, I wanted to experience working and living overseas to challenge myself both professionally and personally. The Australian Volunteer Program, which is an initiative of the Australian government, provided the perfect opportunity to do this,' she explained. 'As part of their commitment to international development and the United Nation's Sustainability Goals, the Australian Volunteer Program connects Australian citizens with overseas organisations looking for support, the sharing of skills and building people's and organisational

capacity.' The Australian Volunteers Program provides opportunities for Australians to become volunteers and assists them with sharing what they have learnt through their international experiences.

According to Leticia, working at Sci-Enza has been an exciting and refreshing experience that has allowed her to gain new skills within science communication while sharing her own skills with Sci-Enza staff to help build the organisation's capacity. She commended Sci-Enza's team for making science accessible to all through their amazing ability to connect with learners from different age groups and backgrounds and concluded by saying: 'Before arriving in South Africa I did not know what to expect, but I have thoroughly enjoyed immersing myself into a culture and environment that is completely new to me.'

# Danielle Roodt awarded a DST fellowship for her PhD

**'First I was overjoyed when I received the email informing me that I had been nominated for the Department of Science and Technology (DST) doctoral fellowship, and then absolutely thrilled to be a winner of this prestigious award.'**

These were the words of an elated Ms Danielle Roodt, a PhD candidate in the Forest Molecular Genetics (FMG) Programme at the Forestry and Agricultural Biotechnology Institute, who was a winner in the DST-Albertina Sisulu Doctoral Fellowships category.

She added: 'It is an incredible honour to have been awarded this fellowship. Following in the footsteps of Mama Albertina Sisulu, I hope to inspire young women to follow their dreams, especially those that involve pursuing careers in the STEM fields.'

Ms Roodt completed her MSc cum laude in 2015 and with her PhD she is focusing on the evolution of wood development in land plants.

'My current research feeds into the vision of better wood products for the benefit of society,' she explained

In 2017, she received a Whitehead Scientific Travel Award to present her work at the annual Plant Biology Meeting held in Honolulu, USA, and in 2018 she was awarded the American Society of Plant Biologists (ASPB) Travel Award to present her research at the same meeting, which this year was held in Montréal, Canada. She had also presented at the Plant Genome Evolution conference in Sitges, Spain, and at numerous national conferences. Ms Roodt is a recipient of the NRF Scarce Skills Doctoral Scholarship and the University of Pretoria Doctoral Support bursary, and is an ASPB Plantae fellow.

*Ms Danielle Roodt*



Ms Roodt also received Golden Key International Honour Society membership for outstanding academic achievements, leadership and service as a student, has acted as a judge at the Northern Gauteng Expo for Young Scientists since 2013, and has been involved in undergraduate tutoring since the beginning of her postgraduate career.

'Science has always been an important part of my life. I grew up in an environment where asking questions was more important than getting answers and where knowledge ruled supreme. I am continuing my studies in science because I want to generate knowledge and share what I discover and learn. By completing my postgraduate studies I can create the perfect environment in which to live out this dream,' Ms Roodt explained.

The Department of Science and Technology (DST) has, since 2003, been hosting the annual Women in Science Awards, which was this year renamed the South African Women in Science Awards (SAWiSA), to celebrate and reward distinguished female researchers in South Africa. This prestigious event, hosted annually during August in recognition of Women's Month, emphasises the importance of education – especially for young girls – and encourages attendees to be role models for youngsters interested in following careers in the STEM fields (science, technology, engineering and mathematics).



# International award for PhD student opens opportunities for future research

**Thulani Sibanda, a PhD student in Food Science, was recently awarded the first prize in the 2018 Food Safety without Borders Graduate Student Paper Competition at the International Union of Food Science and Technology (IUFoST) World Food Science and Technology Congress, held in Mumbai, India.**

“Winning such an international award means a lot for me as an aspiring researcher in the area of food microbiology and food safety. It is greatly satisfying to know that the work we are doing in our research lab finds recognition and acknowledgement in the global community of food science. Going forward, I expect this recognition to open opportunities for more research and collaborations,” he says.

The competition, entered by graduate students in Food Science and Technology around the world, seeks research papers that address a local food safety issue in the students’ respective countries and regions. The competition’s overall objective is enhancing global food safety and strengthening global food science and technology for the benefit of all humanity.

Thulani’s submission was premised on part of his PhD research that he recently completed under the supervision Prof Elna Buys from the Department of Consumer and Food Sciences. The research focused on the stress response of local strains of *Listeria monocytogenes* and its implications on food safety. The paper, entitled

“Understanding the phenotypic characteristics of South African *Listeria monocytogenes* strains with the goal of enhancing food safety”, deciphered the role of stress in shaping the survival dynamics and persistence of *Listeria* strains in contaminated foods, utilising predictive microbiology models and biophysical analytical techniques.

At a time when South Africa suffered the worst listeriosis outbreak in global history, the study became even more pertinent. It brought to the fore the importance of a continual review of food safety standards, necessitated by adaptational changes in pathogen responses arising from environmental pressures. This is critical for efforts by industry and regulatory authorities to prevent food-borne listeriosis outbreaks.

Thulani Sibanda



# UP awarded a Nutrition and Food Security Chair

Prof Hettie Schönfeldt, Director of the African Research Universities Alliance Centre of Excellence for Food Security led by the University of Pretoria (UP), and an associate of the Institute of Food, Nutrition and Well-being, has won the bid for the first five-year cycle of the Department of Science and Technology (DST)/National Research Foundation (NRF) South African Research Chairs Initiative (SARChI) in the National Development Plan Priority Area of Nutrition and Food Security.

The Research Chairs Initiative aims to improve the research and innovation capacity of public universities for producing high quality postgraduate students and research and innovation outputs. The Chairs are held by a university in partnership with a public research institution such as another university, a science council, a national research facility or an academic health complex.

Prof Schönfeldt, a NRF B-3- rated scientist, is interested in nutrition and food security because 'it provides opportunities for finding practical solutions for society as food is an integral part of our daily lives'. She said the Chair in Nutrition and Food Security is aimed at significantly expanding the scientific research base on food and nutrition of South Africa in a way that supports implementation of the national research and development policies, translating into socio-economic benefits.

For Prof Schönfeldt, 'the relationship between the causes and consequences of malnutrition is complex. Poverty and high food prices reduce consumer purchasing power and can leave the nutritionally vulnerable even more powerless when it comes to acquiring healthy foods. On the other hand, nutrition plays a fundamental role in the sustainable development of human capital. Malnutrition adversely affects both mental and physical development and significantly reduces the productivity and economic potential of an individual.'

She explained that the quadruple burden of disease in South Africa is a combination of four colliding epidemics: non-communicable diseases such as diabetes; maternal, newborn and child health; HIV/AIDS and tuberculosis (TB); and violence and injury. 'Eleven of the seventeen underlying causes of premature mortality and morbidity are directly related to malnutrition, manifested in both under-nutrition and over-nutrition. Malnutrition contributes to a vicious cycle of poor health and depressed productivity, impaired ability

to concentrate and learn, trapping families in poverty and eroding economic security,' said Prof Schönfeldt. Increasing agricultural production, without understanding how this production should diversify to address malnutrition and micronutrient deficiencies, will furthermore simplify diets and increase obesity and malnutrition.

The Chair will follow an interdisciplinary approach, putting a nutrition lens on agricultural production, health and education. Education on important dietary choices, and better nutrition through diverse diets, will decrease ill health and improve learners' ability to work and earn a sustainable living,' Prof Schönfeldt explained.

She is an advocate for nutrition research, promoting excellence and impact through the creation, translation and dissemination of science-based information into policies and programmes both nationally and internationally. Her focus is on affordable food diversity, underpinned by nutrient composition and delivery. Internationally she has served as the Chief Rapporteur of the FAO/World Health Organisation Expert Working Group on Protein Requirements for Human Health in Auckland, New Zealand. She was the co-leader of the UP team appointed by the South African Presidency to support the development of a multisector comprehensive National Food and Nutrition Security Policy and Implementation Plan.

*Prof Hettie Schönfeldt*





# Big data for big discoveries

**The University of Pretoria (UP) is one of three South African universities taking a novel approach to analysing big data, building capacity and research expertise ahead of the deluge of data expected to come streaming in through new telescopes like the South African Radio Astronomy Observatory's MeerKAT. This is the first major part of the future Square Kilometre Array (SKA), which will generate data at a rate greater than current global Internet traffic.**

MeerKAT data processing will need to be performed at a level that is unprecedented in astronomy. The Inter-University Institute for Data Intensive Astronomy (IDIA) was set up to create a cloud computing infrastructure for astronomical research in this new era. IDIA comprises UP, the University of Cape Town and the University of the Western Cape. Its goal is to enable SA universities to build expertise in data-intensive astrophysics to provide global leadership in MeerKAT and SKA survey projects, rather than simply letting the data be processed and analysed at existing computing infrastructures elsewhere in the world.

Prof Roger Deane, from the Department of Physics, represented UP at the launch of IDIA at the Iziko Planetarium in Cape Town. The event was a major milestone following the launch of MeerKAT, and it included the first exhibition of an image from one of MeerKAT's large survey projects, which was processed on the IDIA cloud.

Prof Deane explained that generating the images is just one step in the process. He said: 'The true value of an infrastructure such as the IDIA cloud is empowering astronomers, from the new graduate student to the world expert, to analyse and explore these voluminous and rich datasets with ease and efficiency. This dramatically increases the probability of new important discoveries to be made, particularly when combined with the significant and established computational intelligence expertise here at UP. It's an extremely exciting time to be a radio astronomer in South Africa right now – not only do we have the most powerful radio telescope in the world, but also the computing infrastructure and machine learning approaches to produce world-leading science.'

Prof Andries Engelbrecht's Computational Intelligence Research Group (CIRG) recently hosted an IDIA workshop "Artificial Intelligence for Data-Driven Astronomy", which brought both the astronomy and data science communities together.

*Prof Robert Deane (microphone) participating in the IDIA launch panel discussion. Photo: IDIA.*





*From left: Prof Anton Ströh (Vice-Principal: Institutional Planning), Prof Esté van Marle-Köster and Prof Jean Lubuma (Dean: Faculty of Natural and Agricultural Sciences).*

## Head of Animal and Wildlife Sciences inaugurated

**Prof Esté van Marle-Köster recently delivered her inaugural address as Head of the Department of Animal and Wildlife Sciences with a speech entitled 'Animal science teaching and research: Remaining relevant in a changing environment'.**

According to Prof Van Marle-Köster, animal science as a discipline has evolved over many centuries with its origin in the domestication of animals to be used for fibre and food. "Historical events and socio-economic developments contributed to the development of agriculture and livestock production. Traditional farming has been replaced by modern and vertically-integrated livestock production to answer to the need of safe and high-quality food production by growing populations worldwide. Despite the advancements in livestock production, alleviation of poverty and hunger and responsible production and consumption remains among the top priorities on the list of Sustainable Development Goals."

She also boasted with the fact that in 2017, the Department of Animal and Wildlife Sciences celebrated 100 years of successful teaching and research in animal science at the University of Pretoria. "Despite growth in student numbers and positive changes in the demography towards higher number of females, the challenge remains to attract black students to pursue a career in animal science."

Prof Van Marle-Köster also emphasised that the curriculum and teaching methodology have been adapted and transformed since the establishment of the first department, with a teaching approach that stimulate independent thinking and critical analyses. "Contextual learning is of paramount importance in a developing country such as South Africa. Teaching models require continuous transformation and is fundamental to the vision of this department to ensure training of graduates that can function within and beyond the borders of Southern Africa. Research in animal science has experienced major advances due to technology developments, especially in animal genomics."

She concluded her address by saying that future research in animal science will need to accommodate the challenges of resource-limiting environments, socio-economic and animal welfare pressures. "An adequate balance is required in performing relevant research applicable to Southern Africa and remaining competitive on an international level."

Prof Van Marle-Köster was elected as president of the South African Society for Animal Science (SASAS) at the Society's 50th congress, which was held in Port Elizabeth during September 2017. After having previously served as the first female ever on the Society's council from 1999 to 2000, she has become the first female in its history to hold the office of president.



# Two UP professors on the Web of Science “Highly Cited Researcher” list for 2018

Two internationally renowned researchers from the University of Pretoria (UP), Prof Mike Wingfield and Prof Bernard Slippers, have been included on the 2018 Web of Science list of the world’s most highly cited researchers.

Prof Slippers is the Director of UP’s flagship Forestry and Agricultural Biotechnology Institute (FABI) and Prof Wingfield was the founding Director of FABI and continues to drive his research programme at the Institute. Both researchers are included in the prestigious list of approximately 4 000 global academics that are recognised by the Web of Science (managed by Clarivate Analytics) as “most highly cited”.

Their listing is specifically in the field of plant and animal science. Another FABI associate, Prof Pedro Crous (Director of the Westerdijk Biodiversity Institute, Netherlands), who holds an adjunct (extraordinary) position at UP, has also been included in this prestigious list.

The list of most highly cited researchers also includes two other extraordinary professors from UP’s Faculty of Natural and Agricultural Sciences. They are Prof Yves van de Peer (Genetics) and Prof Mujahid Abbas (Mathematics and Applied Mathematics).

**Prof Wingfield** is the Founding Director of FABI and an A1-rated NRF researcher. He has been elected as a fellow of numerous scientific societies, including the Royal Society of South Africa, the Academy of Science of South Africa (ASSAf), the Southern African Society for Plant Pathology and the American Phytopathological Society. He is one of the few honorary members of the Mycological Society of America.

The prestigious African Union (AU) Kwame Nkrumah Scientific Award in the Life and Earth Sciences category was bestowed on Prof Wingfield in Addis Ababa in 2013. Other accolades that he has received include the Johanna Westerdijk Award by the Centraalbureau voor Schimmelcultures (CBS) (Fungal Biodiversity Centre, the Netherlands), and honorary doctorates from the University of British Columbia in 2012, and from North Carolina State University in 2013. He was awarded the Distinguished Leadership Award for International Scientists for 2016 by his alma mater, the University of Minnesota, and the esteemed Royal Society of South Africa (RSSAf) John FW Herschel medal for 2017. Prof Wingfield also received the Chinese Government Friendship Award for 2017.

**Prof Slippers** is the current Director of FABI, the Tree Protection Co-operative Programme and a core team member of the Centre of Excellence in Tree Health Biotechnology. He is also the Acting Director of the Future Africa Institute at UP. He has published more



Prof Mike Wingfield



Prof Bernard Slippers

than 220 papers, many of which appeared in such high-profile journals as *Science*, *Trends in Ecology and Evolution* and *Trends in Plant Science*. Prof Slippers has received wide recognition for his research, both nationally and internationally, including a B1 rating from the NRF, the UP Chancellor’s Award 2016, the British Association Medal (Silver) and the JE Vanderplank Award from the Southern African Society for Plant Pathology.

He is also a founding member of the Global Young Academy (GYA) and the South African Young Academy of Science (SAYAS). He has served in the leadership of both these organisations, including as co-chair of the GYA. Prof Slippers is also a Young Affiliate of the Academy of Science of the Developing World (TWAS) and a member of the Academy of Science of South Africa (ASSAf).

The scientists included in the Web of Science “most highly cited” list are members of an elite group recognised for their exceptional research performance demonstrated by production of numerous highly cited papers that rank in the top 1% by citations for field and year. The distinction they have earned derives not from Clarivate Analytics, but from their peers, who have time and again acknowledged the influence of their research contributions in their publications and citations. The latest list includes 20 names for South Africa, 10 of which are of academics resident in South Africa and who publish with a South African university as their primary address.

# NAS excels at annual Academic Achievers Awards

**Researchers in the Faculty of Natural and Agricultural Sciences were once again honoured for their exceptional academic achievement at the annual University of Pretoria's (UP) Academic Achievers gala event.**

The Chancellor's Award for Research went to Prof Nigel Bennett (Department of Zoology and Entomology), while Prof Tjaart Krüger (Department of Physics) and Dr Eshchar Mizrahi (Department of Biochemistry, Genetics and Microbiology) were honoured with Exceptional Young Researchers awards. The Vice-Chancellor's Award for Excellent Supervision went to Prof Lyn-Marie Birkholtz (Department of Biochemistry, Genetics and Microbiology), and Dr Victoria Rautenbach walked away with the Community Engagement Award.

The Academic Achievers Awards has become a highlight on UP's calendar. In her opening address, Vice-Chancellor and Principal Prof De la Rey paid tribute to the academic staff who had contributed to UP's academic mission through their outstanding performances and achievements and pursuit of excellence in the core aspects of academic life, namely teaching, research and community engagement. She also acknowledged the contribution of the deans and the University's senior leadership in supporting the academic colleagues in their endeavours.

She added that all this effort had contributed to the University being ranked one of the top research institutions globally, through their pursuit of excellence in research, teaching and learning and community engagement. Overall, UP is ranked in the 501-550 rank range, according to the latest QS World University Rankings report released in June last year. Previously, QS stated that, considering there are approximately 26 000 universities globally (although not all are ranked by QS), this rank positions UP among the top 1,9% of universities in the world.





## Prof Nigel Bennett – Chancellor's Award

**The Chancellor's Award is made in recognition of exceptional achievement in the field of research aimed at the advancement of science and the associated promotion of the interests of the University of Pretoria.**

Prof Bennett is a Professor of Zoology and also occupies the Department of Science and Technology/National Research Foundation (NRF) Research Chair in the field of Mammalian Behavioural Ecology and Physiology and the UP Austin Roberts Chair of African Mammalogy. Prof Bennett's research focus is on ecology, animal physiology and behaviour using the African mole-rat as his model animal. He is the world leader in African mole-rat biology, in particular reproductive physiology. He and his co-workers have investigated the ecological and physiological factors that affect the control of reproduction and the evolution of sociality. Unlike other researchers investigating cooperative breeding in mammals, he has done so from a variety of perspectives. The strength of this multi-faceted approach is that it has led to an integrated understanding of reproductive suppression in mole-rats of a type that has not been achieved for any other taxa or group of taxa. His research has set the benchmark for our understanding of phylogenetic and ecological constraints regulating reproductive success and social evolution in mammalian species. His research record ranks him among the best researchers studying social regulation of reproduction in any group of mammals in the world. After completing his PhD at the University of Cape Town (UCT) in 1988 he was employed as a junior lecturer and senior researcher in zoology at the institution until 1995 when he was appointed as a senior lecturer in the Department of Zoology and Entomology at UP. He was promoted to full professor in 2001.

He holds an A rating from the National Research Foundation. He has been a visiting professor at the School of Chemical and Biological

Sciences, Queen Mary College, University of London since 2005 and more recently a visiting professor at the Department of Zoology, King Saud University, Saudi Arabia. He is a Fellow of the Zoological Society of London, a Fellow of the Royal Society of South Africa and a member of the Academy of Sciences of South Africa. He received a gold medal from the Zoological Society of Southern Africa and the Havenga Prize for outstanding contributions to Life Sciences awarded by the Akademie vir Wetenskap en Kuns. He received the UP Commemorative Research Medal for being one of the top 100 scientists in 100 years of its existence in 2008. He has been awarded the UP Chancellor's Medal for his research twice as well as receiving the Exceptional Academic Achiever Award for the past 16 years. In 2015 he was awarded an NSTF Eskom-sponsored award for his outstanding contribution to Science, Engineering and Information Technology as a developer of research capacity. In 2016 he was made a Fellow of the African Academy of Sciences and in 2017 the University recognised him with the Vice-Chancellor's award for outstanding postgraduate supervision. Prof Bennett has served as president of the Zoological Community of Southern Africa for two years. He is editor-in-chief of the *Journal of Zoology* and a past editor of *Proceedings of the Royal Society of London Biological Sciences B*. In 2013 he took on the handling editor position at *Biology Letters*, another Royal Society journal. Prof Bennett has published 345 papers in international peer-reviewed scientific journals, co-authored a specialist book published by Cambridge University Press and has penned twelve chapters in books.



## Prof Tjaart Krüger – Exceptional Young Researcher

Prof Krüger is an associate professor in the Department of Physics. He is passionate about multidisciplinary research and performs his own research in molecular biophysics, a field at the confluence of physics, biology, chemistry, mathematics, statistics, and even information technology and engineering. His main interest is to resolve the molecular details of energy transfer and regulation in the light-harvesting complexes of various photo-synthetic organisms, and to control these processes using shaped light and nanoparticles. He also investigates novel materials for bio-inspired solar technologies. One such project is the design of minimal protein-based light-harvesting complexes that can perform pre-programmed tasks. He designs and builds new spectroscopic equipment, such as single-molecule spectroscopy and femtosecond laser spectroscopy, to push the optical resolution to the technological limits.

He believes that the best way to grow his research is to invest in postgraduate supervision. He currently supervises two postdoctoral, seven PhD and five MSc students. He also has an extensive international collaborative network, which includes one of the 2014 Nobel laureates in Chemistry. Prof Krüger has received a substantial grant from the NRF's prestigious National Equipment Programme, has written several invited review articles and book chapters, and is the co-author of an advanced textbook on optical spectroscopy. In 2015 he received a Fellowship from the Freiburg Institute for Advanced Studies, in 2016 he was awarded a Y1 rating from the NRF and in 2017 he was shortlisted for the Azrieli Global Scholars Program of the Canadian Institute for Advanced Research. He is currently chair of the South African Biophysics Initiative.



## Eshchar Mizrachi – Exceptional Young Researcher

Dr Mizrachi is a senior lecturer in the Department of Biochemistry, Genetics and Microbiology. He is part of the Forest Molecular Genetics (FMG) Programme, in the Forestry and Agricultural Biotechnology Institute (FABI), and is also affiliated with the Genomics Research Institute (GRI). His research group studies the molecular biology and evolution of wood formation in trees, and the synthesis of specialised biopolymers in the secondary cell wall of vascular plants. Their research deals with fundamentals, such as how gene and genome duplications have contributed to the evolution and adaptation of plants, and how a plant cell regulates, apportions and converts large supplies of carbon (in the form of sugar) for the synthesis into different plant cell wall biopolymers. The research also has strong application in the forestry and other plant biomass-related industries, where the ultrastructure and composition of secondary cell walls have direct industrial and economic implications. His group uses genomics technologies for the construction and analysis of comprehensive gene catalogues from 'missing link' plant species with no prior genome sequence information, such as ginkgo, cycads and horsetails. He has authored 23 publications that have accumulated over 900 citations, with an average impact factor of 8.8 and an h-index of 12. Many of these publications are in top ranked plant biology and biotechnology journals (including two invited reviews), as well as some in top tier general science journals such as *Nature*, *PNAS* and *Nature Reviews Genetics*.

Outside of his core research he is involved in leadership training of scientists and serves on the steering committee of the Africa Science





Leadership Programme, a programme of Future Africa, he is involved in organisation of the Tuks Young Research Leader Programme (TYRLP), also in its fourth year, which is creating a community of young researchers in the University who are mindful of emphasising collective leadership, high impact trans-disciplinary research and science communication.

## Prof Lyn-Marie Birkholtz – Vice-Chancellor's Award for Excellent Supervision

Prof Birkholtz is a professor in Biochemistry in the Department of Biochemistry, Genetics and Microbiology. She is the current incumbent of the DST/NRF South African National Research Chair (SARCHI) in Sustainable Malaria Control. As part of the Institute for Sustainable Malaria Control (UP ISMC) she directs the Parasite Control Cluster as a MRC Collaborative Centre for Malaria Research, and her programme comprises two academic staff members, five postdoctoral fellows and three research staff members. Prof Birkholtz also heads the South African Malaria Transmission-blocking Consortium (SAMTC, a joint venture with the Council for Scientific and Industrial Research and the University of the Witwatersrand) focussed on drug discovery for malaria elimination with the University of Cape Town. This year, a NRF Community of Practice was established under Prof Birkholtz's leadership, coalescing the efforts of five SARCHI Chairs towards malaria elimination. Prof Birkholtz has had significant success as a postgraduate student supervisor, graduating a total of 14 PhD, 24 MSc and 38 honours students in the past five years. The remarkable aspect of Prof Birkholtz's achievements in supervision to date is the excellence of her supervisory contribution, as demonstrated in the throughput rates,

the number of distinctions (12 of her 24 MSc students graduated with distinction) and the large proportion of her students who have been awarded bursaries to further their studies.

An impressive number of her postgraduate students have received NRF Innovation Bursaries and Scarce Skills Awards, or have been recognised at national and international conferences through prizes for best oral or poster presentations. Of her PhD students have continued with postdoctoral Fellowships at Yale, Pennsylvania State University and Emory University in the USA. Her involvement with her students in research publication is also impressive, with 25 of her 39 papers published in high-impact journals during this period having been co-authored by postgraduate students. Prof Birkholtz is an established researcher with a current B rating from the NRF. Prof Birkholtz's research is focused on the physiology, biochemistry and pharmacology of malaria parasites. Her work finds biochemical distinctions between the malaria parasite and the human host, which are exploitable for the design of novel antimalarial chemotherapeutics as transmission-blocking drugs. Her team has pioneered the use of large functional genomics datasets to support drug discovery for malaria elimination. As an NRF B-rated scientist, Prof Birkholtz is internationally recognised in the discipline of antimalarial target discovery for sustainable malaria control, reflected in more than 50 manuscripts published within the top 5% of journals in her discipline. She received the UP Exceptional Young Academic Achievers award twice before. Her research programme trains students in cutting edge approaches to understand complex biological processes, and to apply this to relevant problems of the African continent (malaria). She assesses the needs of each individual student concerning their personal background and situation, academic prowess and research expertise and subsequently guides and supports the students to reach their academic and personal development goals. She strives to inspire and motivate her students through active guidance, promoting critical thinking, creativity, innovation and intellectual development in all of her postgraduate students.



## Dr Victoria Rautenbach – Community Engagement Award

**The Community Engagement Award is awarded annually to one individual to recognise community engagement as a long-standing and valued tradition in higher education and an extensive, high-impact practice in teaching at the University of Pretoria. The criteria for the award are aligned to those for the MacJannet Award, which is administered by the international Talloires Network. The Vice-Chancellor and Principal, Prof Cheryl de la Rey, is vice-chairperson of the Talloires Network executive committee.**

Dr Rautenbach is a senior lecturer in the Department of Geography, Geoinformatics and Meteorology. Dr Rautenbach's research interest is spatial data visualisation to support decision-making with a particular interest in informal settlements. The geoinformatics degrees at the UP are accredited by the South African Geomatics Council (SAGC). The Council requires students to acquire certain geographic information science (GISc) knowledge and skills, but they should also develop soft skills needed as GISc professionals. Dr Rautenbach is the course coordinator and lecturer for the final-year geoinformatics project. The aim of the module is to provide students with the opportunity to complete a project from start to finish in which one or more of the studied techniques of data acquisition and processing are used to produce an output of geographically referenced information. To facilitate this, we rely on a community-based service learning approach in an informal settlement called Alaska in the east of Mamelodi, City of Tshwane. The University has a longstanding partnership with the Viva Foundation that facilitates

various outreach and development projects in the settlement, such as early childhood development and enhancing the safety of women.

In 2015, when GISc researchers first visited the informal settlement of Alaska, they had no information about the structure of the settlement, such as the location of tuck shops or communal taps. This information is invaluable to the Viva Foundation to plan impactful interventions in the settlement. For their final year project, the students map an informal settlement and implement a web solution for a problem that they identified in the community. This approach takes them through the entire project lifecycle from data acquisition to presentation of their final results in an easy to understand format, while at the same time giving them the opportunity to put to practice GISc knowledge and skills acquired in individual modules. This allows for a more interactive class environment. Students work in teams which create a social learning space for the acquisition of soft skills, such as teamwork, communication, time management and emotional intelligence. This provides the students with a glimpse into the working environment and on how to resolve conflicts within the group to ensure that a successful end product is delivered. Students experience a great sense of accomplishment on completion of the module, not only through their involvement in mapping the informal settlement but also by being able to give back through activities with the children at the local school, such as a map competition. Over the last two years, with the projects based on a community service learning approach, two projects have won awards and two other projects were selected as finalists. In 2016 a student won the Esri Young Scholar award for her project entitled, A GIS-based response time and risk analysis of municipal firefighting services in the Alaska informal settlement and team Apex PentaVertex won the Responsive Cities Challenge for their prototype, VivaImpilo, which is a web-based business intelligence warning system aimed at providing relevant information to the communities of Ekurhuleni. Although the Community Engagement award is for an individual, it would have been impossible without the support of colleagues, the dedication of the students, the welcoming community of Alaska and Viva Foundation.



# UP ISMC clinches double win at malaria research conference

The University of Pretoria Institute for Sustainable Malaria Control (UP ISMC) researchers scooped awards at the recent Southern African Malaria Research Conference held at the National Institute for Communicable Diseases in Johannesburg.

Hosted by the South African Medical Research Council, in collaboration with the South African National Department of Health and the Southern African Development Community (SADC) Secretariat, the theme of the conference was *Malaria Elimination: A Moving Target*. It created a platform for established and young emerging researchers to present their research and enable discussion on aspects surrounding malaria, and the challenges associated with malaria elimination in the SADC region.

The award for best oral presentation went to Dr Jandeli Niemand, a Y-rated scientist and senior lecturer at the Division of Biochemistry in the Department of Biochemistry, Genetics and Microbiology. She is being groomed as the successor to Prof Lyn-Marie Birkholtz, the current incumbent to the South African Research Chair Initiative Chair in Sustainable Malaria Control. Dr Niemand's talk, titled: *Inducing controlled cell cycle arrest and re-entry during asexual blood stage development of malaria parasites, Plasmodium falciparum*, was selected as the winner out of 39 oral presentations. Her work will soon be submitted for publication in an international journal.

The award for best poster went to Takalani Makhanthisa, a first year master's of science student from the Department of Zoology and Entomology. She was the 2017/2018 intern to the UP ISMC, and is a research assistant within the Institute. Her poster, titled: *Effectiveness of selected cattle-administered endectocides to reduce malaria-vector mosquitoes*, was selected the winner out of 38 posters.

Earlier this year, Dr Phanankosi Moyo, a postdoctoral research fellow in the Division of Biochemistry in the Department of Biochemistry, Genetics and Microbiology was presented with the Brian Sharp Award for the best student presentation in the "Phytomedicines

and Bio-prospection" thematic area at the 7th Multilateral Initiative on Malaria (MIM) Pan African Malaria Conference held in Dakar, Senegal. His presentation, titled *Natural products as potent and pan-reactive antimalarial agents: discovery, isolation and biochemical characterisation* communicated findings of his PhD studies.

As part of his postdoctoral work, he continues with research inclined towards investigation of plants in search of novel malaria transmission-blocking agents, to provide new tools to contribute towards achieving the goal of malaria elimination and ultimately, eradication. He also received a competitive travel grant, from the MIM Local Organising Committee, to attend the conference.

Dr Bianca Brider, a young postdoctoral researcher in the UP ISMC's parasite cluster was awarded a speaking opportunity at the 68th Lindau Nobel Laureate Meeting in Lindau, Germany. She was selected as one of three young international scientists to present a talk on her research at the Master Class, titled *The killer defence: Infection and Cancer*. The Master Classes are designed to allow young scientists the unique chance to profoundly discuss four diverse Master Classes during the duration of the meeting, each with three young scientist speakers and two Nobel Laureates. Dr Brider was one of 12 selected speakers out of over 180 young scientists who applied for the Master Classes. She was the only young scientist speaker from Africa.

Prof Tiaan de Jager, Director of the UP ISMC, said he is "proud of the work being done by the Institute's young researchers. They are contributing greatly to the South African and global malaria elimination agenda".

Dr Phanankosi Moyo, Dr Jandeli Niemand, Takalani Makhanthisa and Dr Bianca Brider





*Dr Betsie le Roux and Dr Corrie Swanepoel*

## Double honour for sisters

**Dr Corrie Swanepoel and Dr Betsie le Roux are two sisters who recently graduated together with their PhD degrees from the University of Pretoria (UP).**

Dr Swanepoel, who is six years older than her sister, completed her PhD in soil science (soil organic carbon dynamics), and Dr Le Roux, a PhD in agronomy (water footprinting). They both studied at the Faculty of Natural and Agricultural Sciences (NAS).

The Water Research Commission funded Dr Le Roux's research and she said: 'I loved my project and was lucky to have a lot of support and a great team which made for a good experience.'

Dr Swanepoel said her road to her PhD was 'full of ups and downs', due to her original idea for a project not working out. 'Luckily I had a Plan-B and lots of support from the people around me that helped me get through.'

Both have fond memories of UP, having visited the main campus with their dad (Dr Attie van Niekerk) back when they were kids. Both are appreciative of the support from NAS, and describe the Department of Plant and Soil Sciences as a strong, dynamic group, with high standards.

Dr Swanepoel studied at the then Department of Plant Production and Soil Science and did her master's degree in soil science, while Dr Le Roux did her master's in Plant Science at the then Department of Botany, so it was a surprise having started their PhDs around the same time and being appointed the same supervisors. Dr Michael van der Laan was their main supervisor and Prof John Annandale was a co-supervisor. It was an even a bigger surprise when they happened to complete their projects together, just in time to receive their degrees at the same graduation ceremony.

According to them, the happiest person was probably their mum (Ms Carol van Niekerk), who was elated to watch both daughters receive PhDs at the same graduation.

Dr Swanepoel currently works at the Agricultural Research Council while Dr Le Roux would like to do consulting research, and maybe continue her involvement with the University of Pretoria.





*Dr Thulani Makhalanyane*

## Dr Thulani Makhalanyane becomes first African elected to ISME board of directors

Dr Thulani Makhalanyane, Senior Lecturer in the Department of Biochemistry, Genetics and Microbiology at the University of Pretoria, has recently been elected to the board of the International Society of Microbial Ecology (ISME). The board currently has 12 directors from the USA, Europe, South America, and Australia. At 34 years old, Dr Makhalanyane becomes the first African to join the prestigious board of directors, taking up a 4-year term from October 2018.

The society, which is based in The Netherlands, recently celebrated its 40th anniversary. ISME hosts the biggest biannual symposia on microbial ecology, with the most recent meeting, held in Leipzig, Germany, attended by over 2 300 delegates. ISME, in partnership with Springer Nature, also publishes the ISME Journal, which is the leading and most respected journal in the field, with an impact factor of 9.6. The ISME Society is the foremost non-profit global network on microbial ecology and seeks to promote the field through outreach activities sponsored by the ISME International Fund. These activities are largely run through the ISME Ambassador Program, which has representatives in over 60 countries.

Microbial ecology, also known as environmental microbiology or microbiomics, is the study of microbes in the environment and their interactions with each other. More information regarding the field

is available on the ISME website at <http://www.isme-microbes.org>. Dr Makhalanyane's research has focused on understanding the microbial ecology of extreme environments. He has established several new research themes at the University of Pretoria, including a Marine Microbial Ecology theme focused on South African geographically strategic regions such as the Southern Ocean.

In 2015, Makhalanyane received the TW Kambule NSTF award as an emerging researcher. He has co-authored over 35 publications since 2012 in leading international peer-reviewed journals. He has presented his work at several international conferences including the International Symposium on Microbial Ecology, SCAR Biology Meetings and the Polar and Alpine Microbiology meetings. He is currently Associate Editor (Frontiers in Microbiology, Extreme Microbiology section) and regularly reviews for several leading journals within the field (such as Nature, ISME J, Environmental Microbiology and Giga Science). He also serves on national and international review panels representing South Africa in Department of Science and Technology bilateral discussions. He teaches undergraduate modules in Microbiology and Genetics, and also supervises 10 postgraduate students (at M and D and honours level). He has successfully supervised three doctoral, three masters and five honours students since joining the University of Pretoria.

# Two NAS researchers announced as new members of ASSAf

Two researchers from the Faculty of Natural and Agricultural Sciences, Prof Lise Korsten and Prof Lyn-Marie Birkholtz, were among 20 of the country's leading scholars and scientists recently inaugurated as members of the Academy of Science of South Africa (ASSAf).

ASSAf was formed in response to the need for an academy of science in keeping with South Africa's democracy. Its objective is to use science for the benefit of society, while also recognising and rewarding excellence and the promotion of innovation and scholarly activity.

New members are elected each year by the full existing membership. According to ASSAf, "membership of the Academy is a great honour, and is in recognition of scholarly achievement. Members are the core asset of the Academy, and give of their time and expertise voluntarily in the service of society."

**Prof Lise Korsten**, Co-Director of the Department of Science and Technology (DST) Centre of Excellence in Food Security. She is also Head of Plant Pathology in the Department of Plant and Soil Sciences, and has been active in the field of fresh produce quality and safety. Her lifetime contribution impacts on commercial farming and, more recently, the informal markets, with the objective of reducing waste and losses and secure food safety.

**Prof Lyn-Marie Birkholtz**, Professor in Biochemistry and Director of the DST/ NRF/ SARCHI Chair in Sustainable Malaria Control. She leads malaria parasite research within the UP Institute for Sustainable Malaria Control. Her research contributes to malaria elimination in South Africa by using systems biology to incite drug discovery towards blocking malaria transmission. As a newly elected member of the Academy of Science of South Africa, she said her research resonates with "the objectives to inspire, promote and recognise excellence in scientific practice, to remove barriers in sharing scientific knowledge, and promote a culture of science in the population at large".



*Prof Lise Korsten*



*Prof Lyn-Marie Birkholtz*



# Postdoctoral fellow recognised for oral presentation excellence



*Dr Dolapo Oladiran*

**Dr Dolapo Oladiran, a postdoctoral fellow in the Department of Consumer and Food Sciences, received an oral presentation excellence award at the 19<sup>th</sup> World Congress of Food Scientists & Technologists (IUFoST), held in India in October 2018.**

"I am indeed honoured and humbled by this recognition. The IUFoST presented a great opportunity to share our research and receive some good feedback on the quality of work that we do, and this makes this award significant for me. I am very grateful to my supervisors, Prof Naushad Emmambux and Prof Riëtte de Kock for their guidance, support and the opportunities they have given me to showcase myself as an upcoming young researcher."

Dr Oladiran presented a part of her PhD research, entitled "Nutritional, oral processing properties and satiety promoting potential of extruded cassava-soy porridge with wheat bran" at the congress. Her PhD research examined how extrusion cooking can be used to modify the functional properties of non-starch polysaccharides in food by-products. The study also assessed the effect of changes in functionality of the instant products on nutritional and oral processing properties and the oral processing properties were related with satiety. The aim is to give more insight into the potential of food by-products as a component of extruded starch-rich foods, to produce instant products that can promote satiety and lower glycaemic index," she explained.

The research for her PhD degree, which was conferred in April 2018, was funded by the DST/NRF Centre of Excellence in Food Security. She also received the John Taylor Award for best PhD oral presentation at the second New Voices in Cereal Science and Technology in South Africa Symposium in May 2017, and was one of 1 000 participants from 129 countries selected to participate in the 1<sup>st</sup> UNLEASH Innovation Lab, held in Denmark in August 2017.



*Prof Mike Wingfield and Prof Cheryl de la Rey ready to cut the FABI-themed birthday cake*

## FABI hosts 20<sup>th</sup> Anniversary Symposium

**A science symposium held on the Hatfield Campus was part of the Forestry and Agricultural Biotechnology Institute (FABI) celebrations of two decades of research excellence. More than 300 FABI alumni, academics, government and forestry industry representatives, as well as many current FABI researchers, staff and students, attended the two-day celebration, themed 'The Road to Research Excellence'.**

Planning preceeding the event took more than a year and the symposium was a resounding success, combining science with art, culture and celebration. The symposium featured 39 presentations, including speed presentations by six FABI postgraduate students. Some 60 foreign guests travelled from 15 countries across the globe to attend the symposium and celebration, among them research leaders and scientists from seven South African and 22 international universities and research institutes.

To mark the event, FABI founding director Prof Mike Wingfield compiled a concise history of the Institute titled 'The Road to Research Excellence: The FABI Story'. This outlines how FABI was originally conceived and how the institute has grown in size and impact during the course of the past 20 years. At the event Prof Bernard Slippers was welcomed as the new Director of the Institute.

Opening the symposium, Prof Wingfield referred to the huge impact of FABI on research at the University of Pretoria and on the forestry and agricultural industries of South Africa and globally. He said that 'the success of FABI lies in its flexibility' and emphasised that 'FABI was an experiment and remains an experiment'. This 'experiment' has enabled FABI, as a standalone postgraduate research institution, connecting numerous departments in the Faculty of Natural and Agricultural Sciences, to initiate many new and innovative techniques to promote postgraduate education, stakeholder relationships and community engagement. The most successful of these were integrated into the structures of faculties, the University and stakeholder organisations.



In its 20 years of existence, FABI has always prided itself on its research output and the number of postdoctoral students delivered. This includes more than 1 250 research articles, eight books, 105 book chapters, 260 MSc graduates, and 160 PhD graduates.

At the conference Prof Cheryl de la Rey, Vice-Chancellor and Principal of the University, welcoming all delegates, made the point that FABI was 'undoubtedly the most successful research institute on the campus'. She also noted that FABI's success could be ascribed to investing in people and excellence.

Former UP Vice-Chancellor and Principal, Dr Johan van Zyl, in his address said that FABI was originally an interesting idea and that 'today we have in multiple what we had anticipated more than 20 years ago'. 'It grew beyond our dreams,' he said.

Prof Jean Lubuma, Dean of the Faculty of Natural and Agricultural Sciences, said that the Faculty viewed the institute as a model of how interdisciplinary research excellence can be achieved.

Numerous speakers, who are today internationally respected researchers and professionals in their respective fields, described how studying at FABI changed their lives, gave them direction and inspired them. Most described FABI as a family rather than a group of researchers. They noted that this cohesion continues as could be seen by the large numbers of current FABIans nicknamed 'black shirts' by virtue of their black FABI 20 shirts, who all worked tirelessly to make the symposium the resounding success that it was.

FABI Director, Prof Bernard Slippers, closed the day's presentations. He outlined his vision for the Institute going forward and shared some of the exciting plans that he has for FABI over next two decades.

During a tree planting ceremony five trees – two wild mango (*Cordyla africana*) and three zambesi teak (*Baikiaea plurijuga*) – were planted by Prof De la Rey, Dr Irene Barnes on behalf of Dr Johan van Zyl, Prof Bernard Slippers, Prof Mike Wingfield and FABIan of the Year, Andi Wilson.

The gala dinner included a presentation by guest speaker, Prof Dr Ir André Drenth, from the University of Queensland, Australia, and a colourful performance of traditional songs and

dances by the UP Avuwa Cultural Ensemble under the leadership of Mxolisi Duda. A spectacular FABI-themed birthday cake was cut to the sound of guests singing 'Happy birthday' while Alexander Buck, Executive Director of the International Union of Forest Research Organizations (IUFRO), presented both Prof Mike Wingfield who is serving a five-year term as President of IUFRO and Prof Bernard Slippers with traditional Austrian Sacher Torte cakes.

*Prof Mike Wingfield and Prof Bernard Slippers*



# Fabulous FABI turns 20

By Marissa Greeff

FABI started with the phone call that Prof Johan van Zyl, then Principal and Vice-Chancellor of the University of Pretoria, made to Prof Mike Wingfield at the University of the Free State in late 1996. After Prof Van Zyl had introduced himself, he suggested that Prof Wingfield might consider moving to UP with the Tree Pathology Co-operative Programme (TPCP).

The aim was to move TPCP, then nearly ten years old, to Pretoria where Prof Van Zyl would support the establishment of a new institute. Prof Van Zyl meant business and the first FABI buildings were already under construction by mid-1997.

## Starting up

The team that relocated to launch FABI included 56 members, five of whom were academic staff and the remainder were students (MSc, PhD), postdoctoral fellows and a few administrative/technical staff.

Every person that moved to Pretoria has their own story to tell about their relocation. One of the more remarkable ones was that of Prof Anna-Maria Oberholster who also had to move a small herd of cattle and, with the assistance of Prof Van Zyl, did just that.

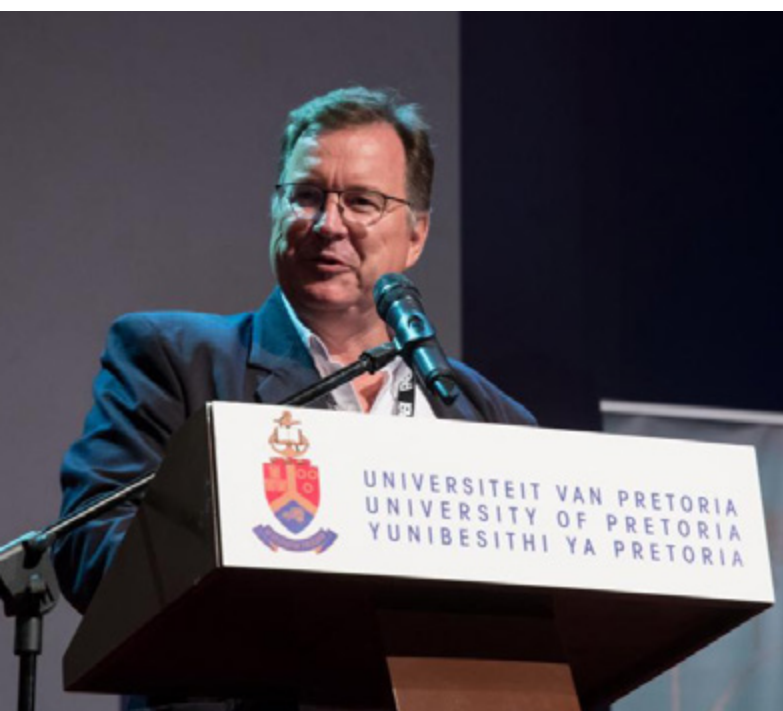
There was no blueprint for FABI other than a broad mandate to build a stand-alone postgraduate structure with a focus on forestry and agricultural biotechnology. It was up to the first academic leaders to establish the Institute's modus operandi. Prof Wingfield wrote the FABI constitution based on that of the UP Mammal Research Institute. Two UP academics who played a key role in the process of establishing a structure for the new Institute were Prof Robin Crewe, then Dean of the Faculty of Natural and Agricultural Sciences, and Prof Henk Huismans, then Head of the Department of Genetics.

## FABI research

The South African forestry industry was a major stakeholder in the establishment of FABI and continued to grow research projects in the Institute.

As molecular biology-based technologies emerged that could contribute to tree growth and development, the industry showed increasing interest in this field. A fledgling programme known as the Molecular Screening Co-operative Programme (MSCP) was established with the CSIR in the early years of FABI's existence to screen trees for resistance to pests and pathogens. It was headed

Prof Johan van Zyl



Prof Mike Wingfield







by Prof Brenda Wingfield, with support from Dr Colin Dyer who later became the Director of the Institute for Commercial Forestry Research (ICFR).

The forestry industry needed a focus on tree growth and fibre traits provided by what became known as the Forest Molecular Genetics Programme (FMG), headed by Prof Zander Myburg.

The Tree Protection Co-operative Programme (TPCP) initially had a strong focus on tree diseases but supported the industry in both the fields of pathology and entomology.

In 2003 the Tree PATHOLOGY Co-operative Programme became the Tree PROTECTION Co-operative Programme. This marked the starting point of a major invasive forest insect pest biological control programme, which has become one of the largest programmes of its kind in the world and has been a catalyst for the growth of FABI as a whole. The base of the programme is in South Africa, but it is integrated with many other tree health projects and programmes globally.

The TPCP and the Forest Molecular Genetics Programme (FMG) are the two largest projects in FABI and they make up about 70% of the student/staff component of approximately 240 FABIans. Other programmes, while somewhat smaller, provide important research support for Agriculture and Forestry in South Africa. These include:

- Avocado Research Programme (leader: Prof Noëlani van den Berg)
- Bacterial Genomics and Tree Health Programme (leader: Prof Fanus Venter),
- Chinese Eucalyptus Research Centre (CERC)-FABI Tree Protection Programme (leader: Prof ShauFei Chen),
- DSTNRF Centre of Excellence in Tree Health Biotechnology (leader: Prof Emma Steenkamp),
- DST-NRF SARCHI Chair in Fungal Genomics (leader: Prof Brenda Wingfield).
- Cereal Foliar Pathogens Programme (leader: Dr Bridget Crampton),
- Diversity and Evolution of Rhizobia Associated with Native Woody Legumes (leader: Prof Emma Steenkamp),
- Eucalyptus and Pine Pathogen Interactions Programme (leader: Prof Sanushka Naidoo),
- Macadamia Protection Programme (leader: Dr Gerda Fourie),
- Molecular Plant-Pathogen Interactions Programme (leader: Prof Dave Berger),
- Molecular Plant Physiology Programme (leader: Dr Juan Vorster),
- Potato Soft Rot Research Programme (leader: Prof Lucy Moleleki),
- Phytobacteriology Programme (leader: Prof Teresa Coutinho)
- Seed Science and Pathology programme (leader: Prof Terry Aveling)

# Agricultural Economics excels in case study competition

Dr Melissa van der Merwe and two students, Jodie Vosloo and Paige Bowen from the Department of Agricultural Economics, Extension and Rural Development, were part of two teams that excelled in a case study competition at the recent International Food and Agribusiness Management Association's (IFAMA) conference.

Held in Buenos Aires, the competition – now in its 13th year – brought together students and young professionals from around the world to demonstrate their investigative and problem-solving skills to provide innovative solutions to practical problems. This year, the featured agribusiness was Bayer Crop Science. Although Bayer managed to expand its global footprint, it faced some challenges in growing some of its projects in developing economies.

The competition consisted of two rounds and had two categories: one for students, and one for young professionals. In the first round, teams had four hours to work through a complex case study, develop a creative and practical solution to the problem and present this to a panel of judges. Eight teams were subsequently selected to participate in the final round, where they were allocated another four hours to work on the addendum to the case. A second round of presentations was then evaluated by a panel of judges.

Twenty-two teams in total participated in the competition, with three young professional teams and 18 student teams. Countries represented included the United States, Australia, Argentina, Peru, the Netherlands and China.

Dr Van der Merwe was part of a team of young professionals that took first place with their ingenious idea to solve major value chain problems through the use of blockchain technologies.

She said: "It was a highly challenging but fruitful experience. Having individuals from different backgrounds, with different views and different prior experiences in one team, with the task to come up with an innovative solution to a difficult problem in four hours, does not leave much time to figure out group dynamics."

The student team, comprising of Ms Vosloo and Ms Bowden of the University of Pretoria (UP) and students from the University of Stellenbosch (US) and North-West University (NWU), featured second in the student category. Ms Vosloo said she was surprised at how the student teams approached the case study from different angles, thinking and interpreting information differently. "The South African team's approach was to ground their solution on a value chain-wide traceability system. By improving the traceability systems, they were able to create a branded product which resulted in a premium for the Indonesian farmers and a shared value throughout the chain," she noted.

Commenting on her experience, Ms Bowen said: "I learned so much about myself; my strengths and how to work and communicate with others. I am sure that this experience has provided me with the tools needed in the working environment. Overall this was a rewarding experience, as it provided me with new knowledge and contacts that will assist me in my career."

*Paige Bowen (UP), Jodie Vosloo (UP), Ayabonga Sibulali (US), and Chiedza Tsvakirai (NWU)*



*Dr Melissa van der Merwe (UP), Hein Gerwel (US), Philip van Zanten (Beekenkamp) and Steven Timmers (Redstar)*







*From left: Christina Welgemoed (Chairperson: NATHouse), Prof Jean Lubuma (Dean: Faculty of Natural and Agricultural Sciences), Dr Harry Wiggins (Best First-year Lecturer) and Dr Quenton Kritzingner (NATHouse guardian)*

*Dr Jaco Visagie (Best Lecturer for Senior Courses)*

## Best undergraduate lecturers honoured

On the occasion of the annual breakfast hosted by the Dean of the Faculty of Natural Sciences on 29 November 2018, the winner of the award for Best First-year Lecturer, as well as the winner of the newly introduced award for Best Lecturer for Senior Courses were announced.

The first of the abovementioned awards went to Dr Harry Wiggins from the Department of Mathematics and Applied Mathematics, and the second to Dr Jaco Visagie from the Department of Statistics.

The students who had nominated Dr Wiggins praised him in their comments, for example: 'The first thing I learned about Dr Wiggins was his absolute passion for mathematics' and 'He was never late for a lecture and was always well prepared.'

Compliments for Dr Visagie were as favourable and included the following: 'He teaches with passion and patience'; 'His enthusiasm and patience encouraged me to work harder and study more efficiently'; and 'He is motivational and inspires students to always strive for the best'.

The above awards were introduced by the Faculty's student house, NATHouse, to acknowledge the effort that undergraduate lecturers put into their teaching. According to Dr Quenton Kritzingner, guardian of NATHouse, '... the lecturers' efforts are really appreciated by the students and these awards serve as encouragement'.

Dr Wiggins admitted that he was 'very humbled by the NATHouse award. It is truly an honour to have been nominated and selected. It

is heart-warming to know that students recognise the hard work I put into making each lesson an exciting learning experience. I am very passionate about teaching mathematics and sharing the beauty of the subject with my students. I take my teaching responsibility very seriously. My aim is to stimulate my students' interest in the content that I am teaching, but also to show, by example, the importance of hard work. I am fully aware of the fact that first-year courses are important stepping stones for students towards their degrees, which will ultimately lead to careers; therefore it is important to produce students who are able to think scientifically and contribute to our beautiful rainbow nation.'

As the first recipient of the Best Lecturer for Senior Courses, Dr Visagie expressed his sincere gratitude to his students for nominating him and added: 'This would not have been possible without you. I am determined to work even harder at my teaching in future'.

The Executive Committee members of NATHouse were thanked for ensuring a successful event through their hard work, which included marketing, obtaining the nominations and organising the voting process.

The nominees for the Best First-year Lecturer award were Ms Christina Kraamwinkel, Ms Brenda Omachar, Prof Wentzel Schoeman, Dr Dolly Langa and Mr Gideon Brits. The nominees for the Best Lecturer for Senior Courses award were Dr Jandeli Niemand, Prof Adrian Shröder, Dr James Roberts, Dr Mapitisi Thantsha, Prof James Raftery, Prof Anabella Gaspar, Dr Carina Visser and Prof Christine Maritz-Olivier.



Prof Mmantsae Diale

# Prof Diale and Malaria Institute won NSTF Awards

Prof Mmantsae Diale and the University of Pretoria Institute for Sustainable Malaria Control (UP ISMC), headed by Prof Tiaan de Jager, were announced as winners in this year's prestigious National Science and Technology Forum (NSTF) Awards.

These annual awards are presented in partnership with mining company South 32 and are referred to as the 'science Oscars' of South Africa, as it is the largest, most comprehensive and most sought-after national awards of its kind. In South Africa, the NSTF is the most representative multi-stakeholder, non-profit forum for the promotion of science, engineering and technology (SET) and innovation, through collaborative efforts.

The theme for this year's awards was 'Sustainable Energy for All'. This is in recognition of the International Decade of Sustainable Energy (2014-2024), as declared by the United Nations.

Prof Diale, Associate Professor in the Department of Physics, won the Engineering Research Capacity Development Awards category.

The UP ISMC team





She was nominated for her exceptional performance as a researcher in materials development for applications in semiconductor devices, used in light harvesting processes.

Her work centres around the collection and storage of solar energy to reduce the effects of carbon dioxide in the atmosphere, and consequently climate change. This work differs from other established energy platforms like nuclear and coal, which can be both harmful and dangerous to the environment. She explained: "The United Nations has long desired that all people on the planet have access to electricity. This millennium goal can only be reached if we have energy technologies that will be accessible at low cost and without disruptions due to unforeseen natural consequences."

She added that South Africa is best positioned in the universe, as solar irradiation is available to all. "What is needed is technologies that will collect and store this valuable cheap resource."

The University of Pretoria Institute for Sustainable Malaria Control (UP ISMC) won the Communication for Outreach and Creating Awareness of Science Engineering Technology and Innovation Award. Malaria is a complex, often fatal, vector-borne disease. Moving from malaria control to elimination requires novel control measures and strategies. Prof De Jager and his team at the UP ISMC, consisting of Prof Lyn-Marie Birkholtz, Prof Walter Focke, Prof Leo Braack and Dr

Taneshka Kruger, strive to contribute towards eliminating malaria through high-quality, trans-disciplinary research, new innovation and education.

The team promotes malaria awareness and prevention by communicating scientifically correct information through formal, informal and more innovative methods, including social media. The UP ISMC is an avenue for the translation of high-impact scientific research from laboratory to community, improving the health of rural communities and visitors to malaria areas.

The UP ISMC developed a cellphone application, MalariaBuddy, in partnership with travel company TWF, and is active on the social media platforms Facebook, Twitter, and LinkedIn. Malaria messages are communicated to local communities, travellers and the general public through various media sources.

Prof Namrita Lall, who holds a South African Research Chair in Plant Health Products from Indigenous Knowledge Systems, was also a finalist in the TW Kambule-NSTF Awards: Researcher category. She is an internationally recognised scholar in the field of Phytomedicine, which is reflected by her recent appointment as an Adjunct Professor at the University of Missouri. Prof Lall has been placed on the Essential Science Indicators list of the top 1% of publication outputs (citations) in the disciplines of pharmacology and toxicology.

## NATHouse Executive Committee for 2018/2019

*Back, from left: Megan Loots (Vice Chair), Carli Kriek, Marissa Swart, Christina Welgemoed (Chair), Dr Quenton Kritzing (Faculty Guardian). Front, from left: Rebecca Motsunye, Tefo Pule (Vice Chair), Carol Luposo, Itumeleng Mathebe, Bridget Maleka, Nomsa Baloyi. Not pictured: Francis Birell and Londiwe Zwane*



# Dr Chris Oosthuizen wins British Ecological Society photography competition

Dr Chris Oosthuizen of the University of Pretoria's Department of Zoology and Entomology recently won the British Ecological Society's annual photography competition, Capturing Ecology, which celebrates the diversity of ecology around the world.

The independent judging panel comprised six eminent ecologists and award-winning wildlife photographers. Dr Oosthuizen, a postdoctoral fellow at the department's Mammal Research Institute, was chosen as the overall winner with his image of a lone adult king penguin standing among a crowd of chicks on the remote sub-Antarctic Marion Island, which is part of the Prince Edward Islands. The islands are the most southerly part of South Africa's official territory.

"Some images have the power to say much more than words," says Professor Richard Bardgett, President of the British Ecological Society, which was founded in 1913 and is the oldest ecological society in the world. "Chris's image, which showcases the remarkable colony life of an iconic bird species, raises awareness of their uncertain future due to climate change."

Dr Oosthuizen took the winning photograph while conducting research on seals and killer whales as a member of the 68<sup>th</sup> overwintering team (2011 to 2012) for the Marion Island Marine Mammal Programme.

He also won the competition's Dynamic Ecosystems category for his image of a southern giant petrel preying on a king penguin chick.

"Photography is a key science engagement tool that can convey important conservation messages," says Dr Oosthuizen, who is also a previous winner of the SA Science Lens competition, held by the South African Agency for Science and Technology Advancement. "Although the global population of king penguins is large, populations inhabiting islands around the Antarctic face an uncertain future. Global climate change may shift the oceanic fronts where they feed further away from breeding sites, forcing penguins to travel further to reach their foraging grounds."

Recent evidence of the collapse of the world's biggest colony of king penguins, the Morne du Tamaris colony at Ile aux Cochons in the





*Winning photo: Copyright Chris Oosthuizen and the British Ecological Society.*

Crozet archipelago, has highlighted the plight of this species. This colony declined by nearly 90% since the early 1980s, from about 500 000 pairs to 60 000 pairs in 2017.

“Many seabirds are more endangered than elephants and rhinos, and deserve the same attention that these conservation icons receive,” he says. “Whereas king penguins are mostly threatened by future oceanic environmental change, introduced mammals such as mice pose a more significant and immediate threat to many other seabird species cohabiting Southern Ocean islands. Such invasive species can wreak devastation on seabird colonies.”

Dr Oosthuizen has been working with the Marion Island Marine Mammal Programme since 2007, when he first overwintered on Marion Island as a seal biologist. He subsequently completed his MSc and PhD degrees, and gained extensive field experience by participating in several national and international research expeditions, including a second expedition to Marion Island and summer expeditions to Antarctica and other sub-Antarctic islands such as Macquarie, Bouvet, King George and Gough.

His PhD considered how among-individual variation and trade-offs shape the life histories of female southern elephant seals. He continues to carry out research into individual variability in the survival and reproduction of elephant seals during his postdoctoral fellowship.

In 2017, Dr Oosthuizen and Prof Nico de Bruyn, of UP’s Zoology and Entomology Department, compiled and edited the book *Pain Forms the Character*. The book is a striking narrative of photographs and stories that capture the adventures of the “cat hunters” and “sealers” of Marion Island – the legacy of those who worked within the sphere of influence of “Doc” Marthán Bester, now extraordinary professor at the Mammal Research Institute.

The winning images will be exhibited in Birmingham in December at The British Ecological Society’s annual conference. They will also be displayed at a week-long public exhibition in London, from 21 to 27 January 2019.

*Pain Forms the Character* is available at [www.marionseals.com](http://www.marionseals.com)





## Advancing the frontiers of science

Dr Vinet Coetzee's main research objective is to create workable health solutions for Africa that can be used in both hospitals and rural areas. Because access to adequate health facilities is often limited in Africa, she knows her approach has to be different. Using her expertise in various disciplines, she set out to find innovative ways to improve the health and well-being of Africa's people.

As Principal Investigator of the Department of Genetics' Facial Morphology Research Group at the University of Pretoria (UP), Dr Coetzee and her research team set out to develop fast, affordable and non-invasive methods to help doctors identify nutrient deficiencies, inborn conditions and high-impact diseases more accurately. They have successfully managed to train computer models to recognise the links between physical features and these deficiencies and conditions. Their 3D camera screening tool and other non-invasive devices will be able to provide this information rapidly, reducing the waiting time associated with laboratory test results.

Remarkably, these non-invasive devices might one day be able to detect a range of health indicators, from fat percentage, to whether a person's diet is lacking in micro nutrients, to the cardiovascular health and immunity of a person. They will even be able to screen for certain congenital disorders, such as Down Syndrome, offering a huge benefit to the African healthcare system.

Dr Coetzee explains that genetic disorders such as Down Syndrome is often only diagnosed in babies when they are as old as eight months, which is already too late for some of the life-saving interventions they need. "The long-term aim of the project is to develop a facial screening tool that can help doctors identify a range of conditions more accurately. It will give doctors a risk estimate for various conditions to guide further testing. This tool will be especially helpful in situations where doctors have insufficient expertise in these conditions and inadequate funds for extensive testing."

While commercial 3D cameras suited for this purpose are exorbitantly expensive, the Facial Morphology Research Group has built a 3D camera for one tenth of the price of the commercial systems currently used in some well-funded hospitals. They are also collaborating with Prof Tania Hanekom of UP's School of Engineering to produce an even more affordable version. Dr Coetzee believes that if these devices can be introduced in all major hospitals across the country, it will make a huge impact on the lives of those in need.

Although analysing the face to learn more about a person's health has been a large focus, she has now also started looking at the palm of the hand to gain insight and has made great strides in the diagnosis of malaria. In collaboration with UP's Institute for Sustainable Malaria Control, she has just filed a provisional patent



for a device that can detect malaria by analysing the colour of the skin on the palm of the hand. Dr Coetzee has tested the device in Nigeria, where a large percentage of the population is grappling with malaria. The ability of the device to correctly identify children with malaria was between 94% and 95%. She says the device would be ideal to use at border posts, immigration camps and other areas where it is necessary to screen many people before follow-up tests are conducted.

While still a young researcher, she is being recognised internationally for her innovative research and contribution to advancing the frontiers of science. She was recently named a Young Scientist by the World Economic Forum. Young scientists from across the world, from a wide range of disciplines making an impact are considered for this honour. The Forum ultimately names those who have shown their commitment to public service and who actively play a transformational role in integrating scientific knowledge into society for the public good.

Dr Coetzee couldn't be a more perfect fit. She will be attending the World Economic Forum Young Scientists' New Champions 2018

Annual Meeting in China later this year, where she will engage with industry leaders, country leaders and some of the world's most influential academics. She will also be able to explore the influence of new business models, industries and technologies, which will all contribute towards the achievement of her main objective – to create workable health solutions for Africa that can be used in hospitals and rural areas.

Dr Coetzee was also selected as a Next Einstein Fellow for 2017–2019 for her research into non-invasive measures in health care. The Next Einstein Forum (NEF) is an initiative of the African Institute for Mathematical Sciences that aims to create a platform that connects science, society and policy in Africa with the rest of the world. The goal of the NEF is to use science for human development globally. NEF fellows are regarded as some of the top scientists in Africa under the age of 42. With this fellowship, Dr Coetzee hopes not only to widen her collaboration networks across Africa, but also to move science forward in Africa in an innovative way, encouraging young scientists to think out the box to improve the health of people on the continent.

*Dr Vinet Coetzee (far right) and her team who built a 3D camera*



# Using technology to create SMART foods for a healthier you

Healthy foods are often expensive and time consuming to prepare. While the diets of lower-income earners are often energy dense, they tend to be low in other nutritional components such as protein, fibre, vitamins, minerals and health-promoting phytochemicals. Sub-Saharan Africa faces a triple burden of malnutrition – ie food insecurity, undernutrition and overweight and obesity – which burdens the social and economic systems of the affected countries.

Internationally acclaimed University of Pretoria (UP) food scientist Prof Naushad Emmambux is on a quest to combat this burden and is developing foods that are nutritious and affordable, while also being cost-effective to produce by small and medium enterprises. Emmambux uses innovative technologies in food chemistry to produce food that is SMART – safe, marketable, affordable, ready-to-eat and trendsetting. He also looks at how SMART food production can combat diet-related non-communicable diseases, which include diabetes and cardiovascular disease.

The modern lifestyles of most consumers have involved a departure from traditional indigenous foods to foods that are quick and convenient. These foods are often nutritionally poor. Emmambux focuses his attention on African indigenous foods for three reasons: they are highly nutritious, affordable and climate resilient,



*Prof Naushad Emmambux*

making them easy to grow in most weather conditions. Incorporating indigenous foods into the SMART approach to food science, Emmambux is developing foods that are healthier and tastier. Cowpea, sorghum and the Bambara groundnut are just some of the traditional foods he is researching.

To combat the triple burden of malnutrition, Emmambux's objectives are to create foods that are lower in energy, higher in protein and can tackle diet-related non-communicable diseases. One focus area of Emmambux's work is to tackle malnutrition in babies and children, which, he explains, typically results from undernutrition, commonly caused by deficiencies in macro nutrients (including protein and energy) and micro nutrients (including vitamin A and iron). A lack of macro nutrients causes stunting in children.

These deficiencies are often a result of food choices. In poor communities, food choices are often determined by a mother's income and work schedule and are therefore influenced by speed and convenience. Breast-feeding mothers are often forced to introduce porridge to their young babies' diets and stop breast-feeding because they need to get back to work. As a result, babies as young as



three months are not getting adequate quantities of the nutrients found in breast milk. The porridge is typically very thick and diluted with water. This dilution lessens the amount of micro and macro nutrients the baby consumes.

Emmambux aims to develop marketable baby foods that have a higher nutritional composition. One objective is to reduce the thickness of baby porridge (which is typically maize pap) without diluting the nutritional value. By using microwave and infrared technologies, Emmambux has managed to significantly increase the amount of energy and protein in these foods. He has also looked at protein-rich indigenous grains as an alternative to maize. Findings suggest he will be able to replicate a similar-tasting porridge from these grains.

Furthermore, while poor families often cannot afford to feed their children meat, cheaper protein-rich foods such as legumes (in their raw form) take a lot of time to cook and are therefore not a viable option for those rushing to work. A meal of bread, butter and tea is a far easier food-choice option for many South Africans. While this meal choice is energy dense, it lacks nutritional value. Emmambux's research on SMART foods has found a nutritious alternative. Somp and beans are cheap and nutritious indigenous foods that are high in protein when eaten in combination. Through innovative technology, Emmambux has reduced the cooking time of somp to only 30 minutes.

At the other end of the malnutrition spectrum is the issue of overweight and obesity. High-energy foods typically have a high fat content. While high fat content is not ideal, fat has an important sensory function and usually improves the texture and taste of food. Emmambux explains that it is therefore important to maintain this sensory experience when looking for alternative dietary options to combat obesity, and Emmambux has done just that. Through food chemistry and nanotechnology, he has developed fat replacers that successfully reduce fat while maintaining its sensory properties. Emmambux has used a modified starch that mimics fat, and used it to develop products such as mayonnaise that only has 20% fat (normal mayonnaise can contain up to 75% fat) and a fat-reduced cheese.

Emmambux's approach uses green chemistry to replace the fat. This is a new and innovative approach that will certainly receive international attention. What makes it so favourable is that it does not use the harsh chemicals that are usually used when creating other fat replacers. Emmambux's approach is therefore healthier to humans and the environment, and is more sustainable.

Lowering the amount of energy in food is key to combatting obesity, and another way to achieve this is by reducing the amount of rapidly digestible starches. When starches digest too quickly in the body they can spike blood glucose levels. Emmambux is developing low-GI foods, which are slowly digested, absorbed and metabolised. Foods that are slowly digested are also considered to be a form of dietary fibre, which has added health benefits.

While there are numerous benefits of using indigenous African foods, Emmambux notes that because starchy foodstuffs like maize form such a large component of many African diets, it is important to also find ways to improve the nutritional composition of these products. 'We hope to produce a range of so-called SMART foods with extra health benefits that are safe, marketable, affordable, ready-to-eat and trendsetting,' he says. To date, Emmambux and his research team have developed a range of SMART foods which include sorghum porridge with a high antioxidant content, gluten-free pasta from a maize-cowpea combination, double-cream yogurt with half the fat, and nutrient-rich baby foods.

Widely recognised for his research, Emmambux was recently invited to return to his country of birth, Mauritius, which was celebrating the 50th anniversary of its independence. He was invited to present his novel research on SMART foods at the International Conference of the Mauritian Academic Diaspora (ICMAD). The ICMAD aims to showcase the international success of Mauritians and brings together members of the Mauritian diaspora from scholarly and academic fields to engage with their counterparts at the University of Mauritius and other local Universities.

In recent years, Emmambux and his UP Food Science colleagues have had about 30 papers on SMART food published in internationally acclaimed, high-impact journals.

*\* Most of the research by Prof Naushad Emmambux is sponsored by the DST/NRF Centre of Excellence (CoE) in Food Security. Emmambux is also co-leading one of the programmes of the CoE.*



## Dedication to animal disease control research

Prof Armanda Bastos has always cared for animal welfare, but it was probably her first field trip to the Kruger National Park as a veterinary researcher that inspired her most to dedicate her professional life to animal disease control research.

As part of a research team, Prof Bastos was involved in the encephalomyocarditis (EMC) virus vaccine trial in African elephants in the Kruger National park. While this virus has one of the smallest genomes, it can cause mortalities in elephants in a matter of days. The virus results in sex-biased mortalities, affecting adult elephant bulls that are in their prime and are dominating breeding and should be ensuring the viability of the population by passing on their “good” genes.

“When I saw for myself the effect that this tiny virus had on an elephant heart and realised that in the 1993/4 outbreak it had wiped out 63 elephants, the majority (83%) of which were males, I was both in awe and determined to unravel the drivers behind ‘virus escape’ and transmission between hosts so that spill overs could be prevented, or at the very least, to limit the impact,” says Prof Bastos.

Since then, she has spent most of her career discovering the diversity of pathogens that exist in wildlife reservoirs (pathogens naturally live in a number of wildlife species), understanding what their threats are and how to deal with them. “Understanding disease ecology is key to formulating intervention and control strategies that limit the impact of infectious diseases,” she explains.

Her research is focused on generating baseline data to assist with the development of improved diagnostic tests and the selection of vaccine strains that will be most effective against the strains circulating in the field. This contributes to animal disease detection and control.

Understanding disease ecology and having baseline data are key to minimising human-wildlife conflict, arising from the perception that wildlife species host numerous economically and life-threatening diseases. “These perceptions reduce wildlife’s perceived value and render all control measures aimed at ensuring food security justifiable,” warns Prof Bastos. “I strongly believe that if we understand the drivers and risks of disease transmission, that it should be possible



to develop control strategies that balance the sustainability needs of our own species with those of others,” she says.

Prof Bastos has worked extensively on foot and mouth disease – which threatens the cattle industry – and African swine fever – which threatens the pork industry. These diseases have severe economic implications due to their global trade bans and therefore strict control zones are in place in South Africa. However, many of these control zones were put in place decades ago when comprehensive surveys were last done. A need for re-evaluation and monitoring of the African swine fever control zone was highlighted by successive studies in which no evidence of the virus could be found in ticks from the Mkuze Game Reserve in KwaZulu-Natal, nor in Swaziland (which is bordered by African swine fever- positive regions).

This highlights some of the benefits of research on animal diseases and wildlife reservoirs – by conducting such assessments a more accurate reflection is gained and areas in need of comprehensive reassessment can be prioritised. If it can be shown conclusively that there aren’t any risks, then it begs the question whether these controls should be kept in place. Recognition of a disease-free status would mean that farmers adjacent to disease-free wildlife areas might be able to upscale their production and improve their living standards.

Prof Bastos’ work has relevance therefore, not only on a conservation level, but also on a food security and economic level and it highlights the importance of striving for a One Health approach, which is an integrative effort to attain optimal health for humans, animals and the environment. At the end of the day, they are all inextricably connected to each other.

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*Prof Armanda Bastos*



# Elephants migrate despite protected area boundaries and international borders

A new study from the Conservation Ecology Research Unit (CERU) at the University of Pretoria set out to unravel migration in the world's largest terrestrial mammal – the savanna elephant.

Migration, a term often associated with wildebeest in the Serengeti, is more common amongst large mammals than one might think, particularly in species that inhabit highly seasonal environments. A common assumption is that elephants also migrate but until now there has been a lack of evidence to support this notion. “We know elephants can move long distances and that these movements often coincide with changes in season, but whether or not these movements were migratory was hearsay,” said Prof Rudi van Aarde, supervisor of the study and Chair of CERU.

The study, published in July in *Scientific Reports*, sets out to answer a very simple question: do elephants migrate? It turns out the answer is a bit more complicated.

Andrew Purdon, lead author of the study explained the findings, “elephants are a facultative partially migratory species. In other words, only some elephants migrate, and if they are migratory, they may not migrate every year.”

The current study, which is one of the largest studies on elephant movement to date, comprised of movement data collected over 15 years from 139 savanna elephants distributed across seven southern African countries. Of the 139 elephants, only 25 showed migratory movement – to and fro – movements between two non-overlapping seasonal ranges. Of these 25 elephants, only six migrated more than once during the period they were tracked.

Although it is unclear why these elephants migrate, theory suggests that benefits for migratory individuals include exploiting changes in food abundance or quality, accessing spatially limited resources, or even escaping competition from other individuals. Prof Van Aarde elaborated, “it is plausible that during the dry season, elephants are restricted to habitats close to permanent water. At the advent of the rainy season, elephants are less restricted by water and are therefore able to move away from their dry season ranges towards areas that are greener, more productive, and that have less elephants.”

These results highlight the adaptive and flexible behaviour of elephants but also their spatial needs.

Prof Van Aarde said that “if conditions demand it, elephants are capable of moving long distances to survive, as long as they have access to seasonal resources and the space to exploit it”.

Although few elephants migrated, most of the protected area clusters that were studied harboured migratory individuals. This included elephants in Etosha National Park (Namibia), Chobe National Park and Moremi Game Reserve (Botswana), Hwange (Zimbabwe), Kruger National Park (South Africa), North and South Luangwa (Zambia), and the Quirimbas National Park (Mozambique). However, almost all the migrations moved beyond National Park boundaries (International Union for Conservation of Nature category I Parks) and 11 migrations crossed international borders.

According to Michael Mole, co-author on the paper, “the one thing these protected areas all have in common is that they are large, often buffered by secondary protected areas, and are relatively unfragmented. Migrations need space, some of these elephants travel over 100km to reach their seasonal ranges.”

“The fact that elephants are still able to move such vast distances and beyond international borders speaks wonders and points to the amazing conservation initiatives employed by many governments and organisations striving to maintain functional space and connectivity between and around national parks.”

Nowhere else is this clearer than in northern Botswana, where 15 elephants migrated. The national parks and surrounding protected areas (or Wildlife Management Areas) form a vast protected and mostly undisturbed heterogeneous landscape. “At a time when long distance dispersals are disappearing, this research underscores the importance of northern Botswana's landscape to support some of the world's longest large mammal migrations,” explained co-author Dr Mike Chase, director and founder of Elephants Without Borders.

Nonetheless, the study begs the question. Are national parks big enough to adequately protect elephants? Elephants that are moving beyond protected areas are at a higher risk of poaching and increasing human populations and habitat fragmentation are a reality threatening to isolate and fragment protected areas across Africa. So can more be done?

“We can start by gaining a better understanding of the spatial needs of large roaming species. Understanding the spatial requirements of species can help better inform the establishment of functional protected area networks,” said Mr Purdon. “In this way, conservation areas across Africa can be large enough to effectively conserve large scale ecological processes such as migration.”

**Citation:** “Partial migration in savanna elephant populations distributed across southern Africa” Andrew Purdon, Michael Mole, Mike Chase, Rudi J van Aarde. *Scientific Reports*; July 27, 2018.

**Link:** [www.nature.com/articles/s41598-018-29724-9](http://www.nature.com/articles/s41598-018-29724-9)







# When temperatures rise, so do crime rates: evidence from South Africa



Over the past few decades there has been a growing worldwide interest in examining the relationship between weather and various types of crime. Most research in this area has however produced inconsistent and often paradoxical results. For example, some studies have found no seasonal fluctuations in crime. Others have however found an increase in crimes during either the colder winter months or warmer summer months.

Very little is known, however, about how the magnitude and spatial distribution of criminal activity in South Africa is affected by climatic conditions. So we set out to determine whether there is an association between criminal activity and climate in the country's capital city, Tshwane.

We were specifically interested in whether the magnitude of crime changes depending on extreme weather conditions, notably temperature and rainfall. In other words: do extremely hot days or high-rainfall days experience higher or lower rates of violent, property or sexual crime?

We also wanted to know whether the spatial distribution of violent, property or sexual crime changes depending on the type of extreme weather event. Simply put, does crime occur in different places on extremely cold days than it does on really hot ones?

Our results indicate a strong association between temperature and criminal activity. That is, as the temperature goes up, so too, does crime. There's a less significant association between rainfall and crime. The spatial distributions of all types of crime are found to differ significantly depending on the type of weather extreme observed.

The results could help law enforcement agencies better understand how weather affects crime patterns in South Africa's urban areas and develop and implement appropriate crime prevention measures.

## Diving into data

The notion that there's a relationship between criminal activity and climate is nothing new. Over a century ago Belgian sociologist and scholar Adolphe Quételet observed that crimes against people reach a maximum during the warmer summer months, while crimes against property reached a peak during winter.



He later developed the temperature-aggression theory, which provides a psychological explanation for the increase in crime during warmer months. It suggests that warmer temperatures will lead to an increase in an individual's frustration and discomfort levels and so increase the likelihood of aggression. This could in turn result in interpersonal crimes such as assault.

We used data and statistical analysis to find an association – if any – between extreme weather conditions and crime in the nation's capital, Tshwane. We obtained climate data for the city from the South African Weather Service for a 5-year period from September 2001 to the end of August 2006.

Next, we calculated daily average temperatures before extracting the ten hottest for each year of the five years. That gave us a dataset of 50 days. The process was repeated for low-temperature days, high-rainfall days, no-rainfall days and random-rainfall days.

Then came crime data for the same period. We obtained this from the South African Police Services' Crime and Information Analysis Centre. The data included the geographical location of each crime; the date and time of day that each crime was committed; and the specific type of crime committed. A total of 1,361,220 crimes were reported in the five-year period across 32 different categories. All crime was then categorised into either violent, sexual or property crimes before we calculated a count of crime per type per day.

Next, we used a recently developed spatial point pattern test to determine whether the spatial distribution of crime on the three types of days – very hot, very cold and rainy – changes. That is, does the spatial patterning of crime in Tshwane change depending on certain rainfall and temperature conditions?

## What we found

Our findings demonstrate that the amount of violent, sexual and property crime in the city of Tshwane is significantly affected by temperature and, to a lesser extent, rainfall.

The magnitude of violent, sexual and property crime was higher on hot days compared to cold or random temperature days. Violent crimes increased by 50% on hot days compared to very cold days. Sexual crimes increased by 41% and property crime by 12%. Violent and sexual crimes in Tshwane also decreased on high-rainfall days. Surprisingly, property crime was found to increase slightly on heavy rainfall days, though only by 2%.

Second, the spatial distribution of violent and property crime was found to differ on days by temperature and rainfall. There is a considerable change in the way that particularly violent and property crime is spatially distributed in Tshwane depending on the weather conditions. We also found that the distribution of sexual crime did not seem to differ significantly by temperature or rainfall.

More research is needed to confirm these findings and to determine if the results can be generalised to other urban areas in South Africa.

## Applications

The results of this research have the potential to inform how law enforcement agencies and other relevant stakeholders tackle crime in South Africa.

Our findings can be used to identify communities that are more prone to crime under certain meteorological conditions and allow stakeholders to target these neighbourhoods and plan interventions. It also allows stakeholders to adequately develop and implement suitable intervention practices in similar at-risk neighbourhoods.

For the police and others responsible for specifically addressing long-term solutions to crime, crime pattern analysis can utilise the understanding of how weather events influence crime patterning and provide measures to take appropriate action.

Gregory Breetzke is an Associate Professor at the Department of Geography, Geoinformatics and Meteorology, University of Pretoria. This article was first published in *The Conversation*.

# Leopards get stressed. Here's how we know – and why it matters

Leopards are versatile predators. These elusive cats can successfully occupy any habitat that supports sufficient numbers of prey species and which provides adequate cover for their ambush-style of hunting.

Leopards also adapt well to settled environments near human activity. But this often brings them into conflict with humans. In South Africa it's been clear [since the late 1980s](#) that although protected areas play an important role in leopard conservation, most of the country's suitable leopard habitat lies outside the boundaries of protected areas, often on private or community-owned land.

This means that leopards must navigate their way across land dedicated to human development, agriculture or mining practices.





As a result, they are exposed to an array of physiological, environmental and psycho-social factors that could cause stress.

Acute stress is essential for vertebrate survival. For example, hunting an impala may be stressful in the short term, but a successful kill equates to survival. In contrast, successive or simultaneous stressors experienced over prolonged periods of time, such as constantly having to avoid human interaction, can result in chronic stress. This, in combination with other factors could affect this [already vulnerable](#) species' long-term health and survival.

But how do you measure the stress levels within a leopard population without causing further distress? I set out to develop a method that would allow us to make a non-invasive assessment of stress levels in free-ranging leopards. It proved to be a [useful approach](#).

My results indicate that although animals were relatively habituated at both sites, those living on the housing estate were more stressed than those in the game reserve. Pregnant females or those rearing cubs had the highest (617% higher) stress hormone levels of all the cats monitored. Overall, we found that wild male leopards showed less variation in their stress levels than females, regardless of whether they were in a protected area or not.

This method offers a new way for leopard biologists to monitor this elusive and iconic species. It can also inform the development of strategies to protect and conserve them.

## Stress hormones

When we – leopards or humans – perceive a stressor, the central nervous system activates the release of hormones which act on the brain. Almost immediately, the pituitary gland releases hormones into the bloodstream and causes an almost instantaneous secretion of adrenalin. This mobilises energy which increases the heart rate and blood flow to the muscles so we have the physical means to confront the threat – or run away.

Over the next few hours, the adrenal glands release glucocorticoids – a type of steroid hormone – into the blood. These glucocorticoids (cortisol or corticosterone, depending on the species) are metabolised in the liver. After metabolism, they are then excreted via the bile into the gut and out of the body in the faeces. They can also travel via the kidneys to the bladder, to be excreted in the urine.

Previous studies [have found](#) that glucocorticoid concentrations are reliable indicators of disturbance experienced by an individual. That makes glucocorticoid metabolites very useful physiological indicators to measure stress. In this study we used scat to monitor the stress levels of free-ranging leopards.

We monitored two leopard populations. One consisted of seven known individuals living on a housing estate in Hoedspruit, a town located to the west of the Kruger National Park, South Africa's largest

wildlife reserve. The other consisted of about 27 leopards living in a protected area adjoining the park.

## Applying the science

We began the study by gathering faecal samples and observational data from leopards in two captive facilities. We used the faecal material to evaluate which of five chosen enzyme immunoassays were best suited to pick up changes in the glucocorticoid concentrations in the faeces. Enzyme immunoassays are widely accepted analytical tools for detecting particular antigens or antibodies in biological samples.

The captive leopards were monitored to determine how long food took to move through their systems, so we knew how long we needed to wait before getting a sample. It also enabled us to determine how long after defecation the hormones remained stable enough for measuring. We then used this information to compare the glucocorticoid concentrations in the faeces of our two groups of wild leopards.

Now that the method has been validated, we hope to use it to further examine how pregnancy, persecution outside of protected areas, levels of tourist activity and environmental factors contribute to the stress levels of this iconic African species.



Andrea Webster

**Andrea Webster is a PhD candidate at the University of Pretoria's Mammal Research Institute, Faculty of Natural and Agricultural Sciences.**

This article was originally published on *The Conversation*. Read the original article [here](#).

# SARChI Research Chair in Clean and Green Energy awarded to Prof Diale



Prof Mmantsae Moche Diale, Associate Professor in the Department of Physics, and leader of the Solar Energy Collection and Conversion Research Group, has been awarded a prestigious Research Chair in Clean and Green Energy by the National Research Foundation (NRF).

The Research Chair is part of the South African Research Chair Initiative (SARChI), which is funded by the Department of Science and Technology. SARChI's objectives are to expand the scientific research and innovation capacity of South Africa; improve South Africa's international research and innovation competitiveness, while responding to the social and economic challenges of the country; attract and retain excellent researchers and scientists; and increase the production of master's and doctoral graduates.

With expertise in semiconductor physics, Prof Diale is an advocate for clean renewable energy. She explained that the objective of the Chair is to significantly increase the number of high quality, well-trained graduates in the energy landscape of South Africa, while also catering for candidates from the Southern African Development Community and other parts of Africa.

The National Development Plan aims to eliminate poverty and reduce inequalities by 2030. South Africa has the capability to

achieve this goal by drawing strengths from its people, growing an inclusive economy and promoting leadership and partnerships throughout society. She said: 'The Plan aims to improve economic infrastructure, where the first three objectives are focused on provision of electricity, with at least 20 000 Mega Watts of this capacity derived from renewable resources. The actions to be taken include the move to less carbon-intensive electricity production which includes the most free renewable energy resource, the sun.'

Prof Diale explained that 'the current situation with energy supplies is that most of the electricity is derived from coal, with nuclear energy from Koeberg and a gradual introduction of renewables in the form of photovoltaics (PV), wind and hydroelectric power. While renewables are still very expensive as compared to conventional energy supplies, solar PV has reduced in price by approximately 70% in recent years, allowing for an introduction of solar panels to non-grid users.'

While independent power producers have been granted an opportunity to expand even without licences, the NDP issues are not well addressed. 'Most of the informal settlement citizens cannot afford to buy a solar panel or establish a power plant – thus continuing to be poor with ESKOM's management issues,' said Prof



Diale. The Chair hopes to reduce the price and supply by redress in the renewable energy sector; produce new technologies made in South Africa, thereby creating sustainability in the economic sector.

She said that the Chair will follow an interdisciplinary approach, putting energy research within different science disciplines, including physics, chemistry, engineering, materials science and biology. 'Energy plays a very important role in economic upliftment and poverty reduction as it gives access to communication methods that improves national education standards. All businesses require a stable electricity supply: for production, sustainable profits, stable workforce and poverty reduction.'

Prof Diale explains that 'affordable fuel production using photovoltaic generation of electricity to power electrolysis, a holy grail for decades, is now within reach, thanks to recent progress due to new and cheap catalysts, based on earth-abundant materials, and the advent of Halide Perovskites, (HaPs) as a basis for one of the materials to be included in the high performance PV cell.'

Furthermore, Liquid Fuels from artificial photosynthesis (AP), as are used today are 'amazingly compact to store and carry energy. This makes the production of solar cells sustainable, while keeping them affordable, which is of major importance.' The integration of PV/AP will then be used to make solar energy accessible to non-grid communities in South Africa, with PV providing electricity when the sun goes up and liquid fuels providing energy when the sun goes down.

Prof Diale's interest in energy was sparked from the time she was growing up in a village, 'with power cables passing through our village' but there was no power station so people did not have electricity. 'My dad had a generator to light up our home and do his business of developing photographs and running movies.'



*Prof Mmantsae Diale*

After many meetings with the authorities, her family was the first to install electricity in their home in the village.

Prof Diale is a late-comer to the South African research landscape, 'Before I came into research, I worked in industries where I was testing electric motors, then became a teacher of physical science,' she said. She was mentored by Prof David Cahen from the prestigious Weizmann Institute of Science in Israel, in materials for PV research.

She enjoys research collaborations in Senegal, Ghana, Zambia, Tanzania and Uganda. All these connections are in solar energy materials research, including nanotechnology and semiconductor physics. She has been involved in a consortium applying for European Union and World Bank mobility funding with African scientists. 'The World Bank has granted us funding with the consortium to work on nanotechnology research in water purification,' she said.

Prof Diale is passionate about human capital development. She is the founder of Women in Physics in South Africa, addressing the issues that affect women's acceleration in Physics research. She also founded the Black Science and Technology and Engineering Professional Association, to address the plight of Technikon (University of Technology) trainees who have not been able to graduate due to lack of experiential training facilities. In this project, Prof Diale has brought in over R25 million in five years, to run the project.

She is also a passionate first year lecturer who believes that 'without proper support of under-performed matriculants, we are losing potential candidates for future leaders in the country'.





# The Great Karoo – a refuge for the trapdoor spider

By Louise de Bruin

The Karoo stretches 400 000 square kilometres over the provinces of the Eastern, Northern and Western Cape. Its vast, open semi-desert landscapes offer a sense of escapism and nothingness, guaranteeing peace and tranquillity for anyone who visits.

This peace is disturbed by the fact that the Karoo is regarded as a development area of South Africa, and international discussions are being had around shale gas exploration (commonly known as fracking), farming, mining and renewable energy infrastructure. Unfortunately, very little is known about the Karoo's biodiversity and how such developments would impact this vast area.

The Karoo BioGaps project, led by the South African National Biodiversity Institute (SANBI), is a collaborative effort involving a number of institutions and a range of experts across the country. This project aims to advance the scientific understanding of valuable Karoo ecosystems, their sensitivities, and which habitats should



be prioritised in order to contribute to informed decision-making when it comes to development. The team conducted detailed

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*BioGaps Spider Team from left: Prof Catherine Sole, Shannon Mitchell, Tshepi Majelantle (honours student who helped out with the fieldwork) and Dr Ian Engelbrecht.*







live in their silk tubes in the ground, without any evolutionary driving force causing them to diverge. Males look different because they leave their burrows in search of a mate. They need to develop strategies that will increase their chances of being chosen by a female to reproduce, while avoiding becoming her prey.

Relaying some of their discoveries, Prof Sole and Dr Engelbrecht note the incredible adaptive abilities of trapdoor spiders. One particular species has a defensive technique whereby it makes a side tunnel leading to a small chamber, branching off the

surveys on 12 representative taxonomic groups in areas targeted for shale gas exploration, and gathered interesting information on plants, mammals, fish, birds, amphibians and reptiles, as well as six invertebrate groups including bees, dragonflies, grasshoppers, scorpions, butterflies and spiders.

The University of Pretoria (UP) got involved with the BioGaps project in 2017, conducting detailed surveys on trapdoor spiders found in the area. This part of the project was led by Robin Lyle of the Agricultural Research Council.

Thirty sites were visited in two weeks, covering the entire area that is being considered for fracking. Prof Catherine Sole and Dr Ian Engelbrecht from the Department of Zoology and Entomology at UP shared their expertise and focused on gathering as much data as possible on the trapdoor spiders of the Karoo. This research also formed part of an honours project conducted by Ms Shannon Mitchell. The UP researchers found many species that had not been recorded before and decided to take their project a step further by identifying processes driving biodiversity in the Karoo region. They looked at the DNA of trapdoor spiders to find patterns and determine how different populations were related to each other from an evolutionary perspective. They also tried to establish whether any other factors could be identified that were driving these patterns.

As Dr Engelbrecht explains, the important point this research brings to the conservation is that these patterns and processes can assist in identifying hotspots of evolutionary diversity and bio-geographical barriers that might not be picked up in a general study of species distribution.

The DNA studies suggest that there could be many more undiscovered trapdoor spiders in the area. 'If these patterns hold true for more than just spiders, the Karoo becomes even more interesting from an environmental point of view, and needs to be conserved,' says Prof Sole.

When identifying new trapdoor spider species, it is the males that need to be analysed. Females are morphologically conservative, making it difficult to tell species apart, says Dr Engelbrecht. Females

live in their silk tubes in the ground, without any evolutionary driving force causing them to diverge. Males look different because they leave their burrows in search of a mate. They need to develop strategies that will increase their chances of being chosen by a female to reproduce, while avoiding becoming her prey.

The sampling process is delicate work, but once the top layer of soil is scraped from the surface, finding the hidden trapdoors becomes easier. The spider then has to be carefully dug out of its tunnel. Because the soil is so hard, digging 30 centimetres into the ground is rather labour intensive. Meticulous care must be taken not to hurt the spider.

Conservation of trapdoor spiders is important for a number of reasons. They are an ancient group of animals that are also said to be very long-lived, with some reports saying they can live up to 40 years. They reproduce very slowly as well and do not disperse very far. Furthermore, they are susceptible to habitat disturbance and destruction. As noted, they are important in assisting in the identification of broader evolutionary processes.

Fracking and other developments have the potential to cause serious disturbance to the biodiversity of the Karoo. Because the area is so arid and has been degraded by extensive livestock farming, some scientists believe ecological restoration in the Karoo would take over 60 years.

Given the current pressures the environment faces – with infrastructure development and habitat destruction, as well as realities such as climate change – projects like these are extremely important in determining areas suitable as refugia. Refugia are locations where species can take refuge – areas that support a population of a once-widespread species. Refugia can be detected by analysing the DNA of organisms, like the trapdoor spider, that have a small habitat range. This gives insight into where refugia might have been in the past, which in turn aids in determining key areas that should be conserved. A lack of refugia exacerbates the threat of a species' extinction.

*\*Prof Sole is a molecular biologist working on DNA on a wide range of invertebrates. Dr Engelbrecht's main focus areas include primitive spiders, such as baboon spiders and trapdoor spiders.*



*Prof Adrian Shrader Photo: Nicole Hagenah-Shrader*

# White rhinos communicate through their ablution habits

*By Louise de Bruin*

A study by a University of Pretoria researcher, Dr Courtney Marneweck into the ablution habits of white rhinos in the Hluhluwe iMfolozi Game Reserve, KwaZulu-Natal, has revealed that these animals use their place of defecation to communicate with each other and take decisions that can affect their ecology.

Their places of defecation are known as “middens” and are found throughout male territories, in specific areas like rhino paths and on the side of roads. Behavioural ecologist and Associate Professor in the Mammal Research Institute (MRI) and Department of Zoology and Entomology, Prof Adrian Shrader (and his colleagues, Dr Courtney Marneweck and Prof Andreas Jürgens) discovered white rhino middens are serving as centres to pass on information.

A key question was, who was providing information at these middens and who was receiving it. To answer this, the frequency that individuals visited the middens had to be monitored. In a white rhino territory, there is one territorial male only, and one or two resident subordinate males that do not try to stake claim of the territory. Since male territories are smaller than the many overlapping female home ranges, several adult females and adolescents pass through them regularly.

To find out more about the information transferred, the team extracted odour samples from around the dung of specific individuals, using a micropump. “Any odours, even odours from food or perfume, are nothing more than a combination of Volatile

Organic Compounds (VOCs), and from the samples we collected, we could determine the actual compounds being released from the dung.” From these odours alone, white rhinos are able to pick up information about the age and sex of individuals that have defecated at the midden; and whether the females are in oestrus (heat) and whether the males were territorial or not.

To test these findings, Dr Marneweck and the team created artificial dung odours of a female in oestrus and a territorial male to check if the VOCs that were picked up, did in fact transfer this information. Then, they tied dried grass together to mimic dung, and soaked it in liquid containing the scent of a female in heat. The fake dung was then placed in a midden and the territorial male’s responses to the scents were recorded, using a camera trap.

When the fake scents were placed in the midden, the number of visits there by the dominant bull increased, as well as the time he spent there. Prof Shrader says, “this is probably because he wants to check if he is picking up the right scent – because he hasn’t been able to find either a territorial male or an oestrus female in his territory.” These responses, along with other behavioural observations, confirmed their findings on the information that rhinos communicate at the middens.

The study also found that there are individual males that wander into territories and visit these information centres. They are potential threats to the dominant bull and are believed to be there to ascertain



information about who owns the territory, how many females there are, and how much of a threat the dominant bull is. Once they have gathered this information from the midden, they may challenge the dominant bull for his territory.

Another finding from the study was that there are a number of middens throughout the territory used by the dominant bull. Dominant bulls manage to defecate in smaller volumes so that they can disseminate “information” over the middens of their territory. “It is quite remarkable to think a 2 300kg body is able to control his bowel movements so that he can ensure sufficient information is disseminated throughout his territory,” says Prof Shrader.

Prof Shrader explains that there is a specific spatial component to these middens. The dominant bull defecates in the centre of the midden only, and nowhere else. He will also kick the dung to enhance the scent, showing who is boss. Other rhinos tend to defecate around the edge of the midden. A challenger to the dominant bull’s territory might defecate in the centre, indicating that he is challenging the dominant bull.

Prof Shrader and his colleagues concluded that while white rhinos passing by use the middens, the dominant bull provides the most



*A white rhino midden. Photo: Prof Adrian Shrader*

information, as well as gathers the most information from these areas.

*This research has been featured in international journals, including Animal Behaviour, Journal of Chemical Ecology, and Proceedings of the Royal Society.*

*Prof Andreas Jürgens and Dr Courtney Marneweck. Photo: Prof Adrian Shrader*





# How adapting to different climates has helped a pest spread across the globe



*The Mediterranean fruit fly, Ceratitis capitata. Photo credit: Andre Coetzer*

**If you have ever bitten into a fruit and been disgusted to find it wriggling with cream-coloured maggots, you have already met at least one member of the fruit fly family.**

True fruit flies belong to the fly family *Tephritidae*, and are quite different from the small *Drosophila* or “vinegar flies” that hover around and drown in your glass of wine. Unlike *Drosophila*, which lay their eggs in decaying organic matter such as fruit in a bowl in your kitchen, true fruit flies lay their eggs in ripening fruit that’s developing on the tree.

Once the larvae hatch, they feed on the fruit they were laid in. The damage caused by this larval feeding means that true fruit flies are trouble for fruit growers. Farmers often turn to costly control tactics to try and prevent infestation by true fruit fly larvae, reducing their profits. And fruit infested with true fruit fly larvae can’t be exported. This pest costs fruit farmers and governments well over US\$1 billion each year.

The Mediterranean fruit fly, *Ceratitidis capitata*, is among the most destructive true fruit flies in the world. It is native to Africa but is now found in countries around the Mediterranean Basin and Middle East, South and Central America, and parts of Australia and the US. What’s remarkable about this almost global distribution is the wide

range of climates that the Mediterranean fruit fly has been able to colonise and thrive in.

My colleagues and I set out to study how this little pest has managed to spread over such wide-ranging environments. We found that the Mediterranean fruit fly is highly adaptable to different environments and can survive extremes in temperature, and water and food availability.

## Environmental stress tests

All insects are ectotherms. This means that their body temperature and all life processes – movement, digestion, growth, development and reproduction – are determined by the temperature around them. Water and food availability are also important for survival and growth.

We measured the ability of Mediterranean fruit flies from different climates across South and East Africa to survive high and low temperatures, as well as a lack of water or food. We collected infested fruit from eight sites in South Africa and Kenya, then held the developing larvae and pupae under common environmental conditions in the laboratory. The adult flies were then used in experiments.



First we transferred flies from each site to different temperatures. This is because prior exposure of the Mediterranean fruit fly (as well as other insects) to a warmer or cooler temperature improves their survival when it comes to tolerating extreme temperatures.

We also wanted to know whether closely related populations responded to environmental stress more similarly than populations that were more distantly related. We built a phylogenetic tree based on the genetic fingerprint of each population. Then we compared populations taking into account how closely they were related and the climate they were sampled from.

Our results, recently published in the open access journal Scientific Reports, showed that the Mediterranean fruit fly is highly adaptable.

The eight populations we sampled showed different patterns in their ability to survive high and low temperatures, and lack of water or food. The results lead us to believe that each population adapts differently to its local environment.

In addition, all populations exhibited some flexibility in their environmental tolerance as a result of the temperatures they had experienced before testing. If flies had experienced cooler temperatures before testing, their tolerance of cold temperatures was improved but they were less able to withstand high temperatures. Prior experience of warmer temperatures led to improved tolerance of high temperatures and reduced tolerance of cold temperatures.

## An adaptable pest

Our research suggests that the Mediterranean fruit fly has been able to leave its native Africa and become a globally invasive fruit production pest because of its ability to adapt rapidly to new environments.

Its ability to evolve rapidly to different environmental conditions also suggests that the Mediterranean fruit fly will be well suited to cope with climate change.

Short of using pesticides, which are expensive, there are other steps farmers can take to limit the numbers and spread of the Mediterranean fruit fly. Harvested fruit should be inspected and sorted to prevent infested fruit from reaching markets. Temperature or radiation treatments can also be applied to kill larvae in the fruit.

For countries not currently affected by the Mediterranean fruit fly, it is vital to prevent its entry and establishment by enforcing stringent quarantine regulations.

In both cases, government agencies and grower collectives need to provide support required to limit the economic damage caused by this adaptable pest.

**Christopher Weldon, is a Senior Lecturer in Entomology, at the University of Pretoria. This article was first published in *The Conversation*. Click [here](#) for the original article.**

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*Dr Chris Weldon*



# Dr Victor Meyer discovers new woodlouse species in termite nests of Kruger Park

A new species of woodlouse has been discovered inside termite mounds in the northern Kruger National Park, east of Phalaborwa and near Mopani Rest Camp, by University of Pretoria (UP) entomologist Dr Victor Meyer.

There are more than 3 500 species of woodlice in the world, and this is the first time that a species with an affinity for termite nests has been discovered in this family. The Kruger National Park resident, named *Ctenorillo meyeri* after Dr Meyer, was described and published by world authority on terrestrial isopods Prof Stefano Taiti of Florence, Italy, in the peer-reviewed journal *Onychium*.

*Ctenorillo meyeri* belongs to the *Armadillidae* (pillbugs) family, which are generally found living in tropical and temperate regions. Many have adapted to the subterranean environment, even colonising caves and termite mounds.

Dr Meyer explains that although called a louse, *Ctenorillo meyeri* is actually not an insect but a crustacean. The woodlouse has seven pairs of legs with a scaly body of more or less one centimetre in length. The new species “can ably roll up into a ball to protect its vulnerable undersides against predators and the elements,” he adds.

*Ctenorillo meyeri* belongs to the order of isopods, but not all isopods are made equal, meaning some roll and some don’t. Woodlice or isopods breathe through gills underneath their abdomens which need to be kept moist, so by rolling up they retain moisture for longer. Those with long uropods (last pair of abdominal appendages) cannot roll up. This disadvantage means that breathing is impaired when moisture is unavailable in the substrate or environment where woodlice occur.

Woodlice play a significant ecological role in nutrient cycling by fragmenting woody litter, which includes dead twigs and leaves that they eat. Their droppings help produce compost, and they also aerate the soil. Dr Meyer explains that termites are herbivores, and therefore will not harm the isopods. “This is an example of commensal symbiosis, as the termites don’t benefit from the



Dr Victor Meyer. Photo credit: Nadine Meyer.

presence of the isopods, nor are they adversely affected. However, the isopods gain further protection and access to food inside the termite mounds.”

He says what sets this species apart physically is the number and arrangement of knobs (bosses and tubercles) on the back (dorsum) of the animal, as well as a reduction in the two compound eyes to fewer ommatidia (lens units or little eyes making up a compound eye), and having a body that’s pale-brown in colour. Compound eyes occur in insects and crustaceans and greatly increase their field of view, meaning these organisms are able to see in every direction, although the sharpness of an image produced by a human eye is about 100 times better than that of a compound eye. The disadvantage of a compound eye is the lack of ability to focus.

“Woodlice pose no threat to humans, other than termites, which are often considered pests in agricultural settings and urban environments,” Dr Meyer says. Their predators are ants, spiders and birds. In the United States, isopods are often called “roly polies”; in New Zealand they are known as “slaters”; and in parts of the United Kingdom they are known as “cheeselogs”, “chiggy pigs” and “gramersow”. Other nicknames include “leatherjackets”, “billybuttons”, “billybakers”, “bellybuttons”, “ticktocks” and “ogopogos”.

Dr Meyer’s main field of study is termites, which led to a PhD in Entomology from UP. “The mere thought of termites conjures up images of nasty bites, destruction of woodwork, and the nearest pest control company! In natural habitats, however, termites are beneficial, and an integral part of the ecosystem. Termites are very efficient in reducing woody litter to simple organic compounds. They are pivotal in nutrient cycling.”

He says he’s always been interested in nature and paying attention to “the little things that are chronically overlooked and underrepresented in conservation efforts”. Dr Meyer is thrilled about the species he discovered being named after him. “I feel pretty honoured to be associated with such a unique and interesting critter!”



# Final farewell to Prof D (Dawie) J Stoker

It was with great sadness that we became aware of the passing away of Dr Dawie Stoker, a former Head of the Department of Statistics (1962 to 1980), on 21 November 2018. He was born in Potchefstroom on 15 April 1929.

The statistical community honours a big name in science in South Africa and specifically in statistics. His legacy is experienced by many people in South Africa, including students, researchers in many disciplines and practitioners in a vast array of sciences.

On 1 February 1955 Prof Stoker joined the Department of Statistics at the University of Pretoria (UP) as senior lecturer. He was promoted to Professor and Head of the Department in 1962. He served in this capacity until 31 December 1980. In 1956 the two-year major course in mathematical statistics was introduced at UP, and in 1967 the three-year major course for the BSc and BA degrees was introduced.

Prof Stoker was awarded overseas bursaries for doctoral study in mathematical statistics at the University of Amsterdam, the Netherlands, under Prof David van Dantzig. At the same time, he acquired practical experience in the application of statistics at the Mathematical Centre in Amsterdam. The Dr Math et Phys degree was awarded to him on 19 January 1955.

Under strong encouragement from Human Sciences Research Council (HSRC) President, Dr J C Garbers, and Vice-President, Dr AJ van Rooy, he joined the HSRC as Director of the Institute of Statistical Research on 1 January 1981. In July 1982 Prof Stoker was promoted to one of the four vice-president posts of the HSRC. While at UP and the HSRC, he supervised 10 PhD students. He was appointed as honorary professor in the Department of Statistics at UP on an annual basis from 1991 until 2008 (he became seriously ill in 2009).

He was involved in many training courses of HSRC personnel and other interested parties in Pretoria, as well as at various statistical offices and universities. He also headed, among others, two important large-scale projects, namely

1. an investigation into differential entrance requirements for tertiary educational institutions, and
2. sample-based population estimates in 88 inaccessible areas of the RSA as part of the population census in 1991.

Immediately after his retirement he accepted appointment as a chief research specialist at the HSRC, and from 1 January 1991 as



Director of the Institute for Statistical Research. On 1 July 1992 he left the HSRC to take up the position of director of STATOMET in the Department of Statistics at UP. STATOMET was founded by Prof Crowther in the Department, with the view to assisting the private sector to solve research problems. He finally resigned at the end of 1996, and from 1 January 1997 he became a private consultant.

As a consultant his main clients were the Central Statistics Service (CSS, headed by Dr M Orkin – the name subsequently changed to Statistics South Africa, or StatsSA), the HSRC and private market research organisations. This involvement continued until the end of 2004. As a consultant for StatsSA, Prof Stoker was, among other things, responsible for the estimation of the undercount in the 1996 population census and co-responsible for the estimation of the undercount in the 2001 population census and the community survey in 2007.

In 1966 he was requested by the South African Statistical Association (SASA) to launch the *SA Statistical Journal*. He acted as editor and managerial editor for the first issue of the journal in the first half of 1967, but due to the amount of work involved, Dr Cas Crouse was appointed as editor from the second issue in 1967 onwards, while Prof Stoker continued as managerial editor. He also was a member, fellow, past-president, honorary member and honorary president of SASA.



Dr Osmond Mlonyeni

## Dr Mlonyeni appointed to The Innovation Hub Board

Dr Osmond Mlonyeni, a postdoctoral fellow at the Forestry and Agricultural Biotechnology Institute (FABI), has not only published in international peer-reviewed journals and presented at national and international conferences, but has recently been appointed to The Innovation Hub's Board of Directors.

As the first accredited Science and Technology Park in Africa, The Innovation Hub aims to be an innovation agency of choice and build Gauteng's competitiveness by providing incubation programmes in the high technology, green economy and bio-economy

sectors. Partnerships between government, industry, academic and research institutions are regarded as important to drive innovation and foster skills and enterprise development.

On his appointment, Dr Mlonyeni says: "I believe that science and scientists have a role to play and contributions to make in the socio-economic development of society, even more so in a developing country. Therefore, this appointment provides me with an opportunity to be of service to my country beyond the confines of academia, but drawing from the skills and insights development from it."

Even as young researcher, Dr Mlonyeni is no stranger to achievements and leadership positions. He was selected by the Royal Society to attend the Commonwealth Science Conference 2017 in Singapore, where he was one of 12 speakers selected to deliver an oral presentation during the PhD and postdoctoral session. His presentation was lauded as one of the top three. In 2015 he was selected as a Horst Köhler Fellow, following nominations by the Global Young Academy and Robert Bosch Stiftung to attend the 65<sup>th</sup> Lindau Nobel Laureate Meeting in Germany. For this meeting he was selected as one of five young scientists from Africa to be interviewed about their research and views about science in Africa (<https://www.youtube.com/watch?v=J2jiGb5seAA>). Dr Mlonyeni is also a Mandela Rhodes Scholar and member of the Golden Key International Honour Society.

He has served at various leadership levels of student-led organisations and participated in different management committees within the University of Pretoria. He is also a former SRC member and Chairperson of the Postgraduate Student Association of Natural and Agricultural Sciences at the University.

Dr Mlonyeni's research forms part of a broader project aimed at understanding diversity in the *Sirex-Amylostereum-Deladenus* symbioses. This system serves as a model to understand the potential role of diversity in invasive pests and biological control systems. The aim is to develop tools that provide opportunities to improve the efficiency of the biological control programme against *S. noctilio*, but also has relevance to the management of other invasive pests.



# Geoinformatics expert appointed as Head of Geography, Geoinformatics and Meteorology



*Prof Serena Coetzee*

Prof Serena Coetzee's appointment as Professor and Head of the Department of Geography, Geoinformatics and Meteorology (GGM) in the Faculty of Natural and Agricultural Sciences became effective on 1 October 2018.

Her vision for the Department is to further position GGM as a department that has local impact, but is also internationally relevant.

According to Prof Coetzee, 'the [Department of Geography, Geoinformatics and Meteorology](#) is special due to the multi-disciplinary nature of its research and education. Geography seeks to understand the natural and human complexities of the earth, which are often closely related to the built environment. Research and education in the Department therefore lies at the interface of the natural and social sciences, but also draws on principles from engineering and information technology in the application of geoinformatics and remote sensing.'

She further explained that most of the Department's work is directly related to one or more of the United Nations Sustainable Development Goals (SDGs), for example the undergraduate module in sustainable development; the postgraduate programme in environmental management; the development of standards for measuring and reporting SDG indicators; seasonal forecasting in support of climate adaptation and food security; and research and community engagement towards achieving sustainable cities and protecting biodiversity. She added: 'Due to the geographical nature of the field, our research and education is always directly related to a specific location, very often in proximity to our university, country, continent or hemisphere.'

Prof Coetzee has received a C1 rating from the NRF. Her [research](#) focuses on the ever-increasing volumes of geographic information and the challenges of making these available, accessible and usable. She chairs the International Cartographic Association's Commission on SDI and Standards. As chairperson of the programme maintenance group of ISO/TC 211, Geographic Information/Geomatics, she coordinates international standards development to ensure the harmonisation of standards and alignment with changing requirements and technological developments. She helped initiate the development of a suite of international addressing standards and led the first part of the series (ISO 19160-1:2015). Prof Coetzee represents the Council on Higher Education on two South African statutory bodies, namely the Committee for Spatial Information (CSI) and the South African Geomatics Council (SAGC). Her research is interdisciplinary and is related to various United Nations Sustainable Development Goals (SDGs). This puts her in a favourable position to contribute to the realisation of the University's Vision 2025 and the Faculty's strategic priorities, and to take the Department to the next level.

Prof Coetzee started her career as a software engineer on the global software development teams of two desktop GIS products. Subsequently, as director and project manager at AfriGIS, she led a wide variety of GIS projects until 2006, when she joined the Department of Computer Science at the University of Pretoria. She was appointed in GGM in 2011 to coordinate the geoinformatics discipline and is also the Director of the [Centre for Geoinformation Science](#). She has been serving as acting Head of Department since March 2018.

# New Head appointed for Zoology and Entomology

**Prof Armanda Bastos was appointed to serve as the new Head of the Department of Zoology and Entomology (ZNE) from 1 December 2018.**

She is a Principal Investigator for the DST/NRF SARCHI Chair in Mathematical Models and Methods in Bioengineering and Biosciences (M3B2), which is being hosted by the Department of Mathematics and Applied Mathematics. Prior to her appointments at UP in July 2000, she was a senior veterinary researcher at the Onderstepoort Veterinary Institute (OVI) from 1994 to 2000. The move from the OVI to the Department of Zoology and Entomology has broadened her research, which was previously focused on infectious disease research at the wildlife-livestock interface, to also include diseases occurring at the interfaces between humans, domesticated animals and wildlife.

Prof Bastos holds a PhD in Microbiology (2001), an MSc in Molecular Genetics (1997), a BSc(Hons) in Genetics (1993) and a dual-major BSc in Genetics and Zoology (1992), all from the University of Pretoria. She is a Research Associate of the Mammal Research Institute (MRI), of which she was the Deputy Directory and Acting Director from January 2016 to July 2017.

The C1 rating she received from the NRF and her appointment on the editorial boards of *BMC Genetics* and *Frontiers in Veterinary Science* unequivocally confirm her status as an established researcher in her area of focus. She has published widely in top journals and has acted as supervisor to several postgraduate students. Prof Bastos has substantial experience in tackling One Health challenges in sub-Saharan Africa and is actively involved at the forefront of multidisciplinary research related to the United Nations Sustainable Development Goals (SDGs). Her vision for the Department attests to a clear understanding of its dynamics and challenges.

This puts her in favourable position to make a valuable contribution to UP's Vision 2025, to address the Faculty priorities and to take the research-intensive Department of Zoology and Entomology to new heights.



*Prof Armanda Bastos*





*Prof Sheryl Hendriks*

# Prof Sheryl Hendriks appointed Head of Agricultural Economics, Extension and Rural Development

**Prof Sheryl Hendriks has been appointed as Head of the Department of Agricultural Economics, Extension and Rural Development, which became effective 1 November 2018.**

Prof Hendriks, who holds a PhD in Agriculture from the former University of Natal (UKZN), has long excelled in this male-dominated field and its related disciplines. From 2012 to 2014, she was President of the Agricultural Economics Association of South Africa, and in 2018 received the FR Tomlinson Commemorative Medal for service to the profession.

Her research focuses on food security policy analysis and impact assessment. A respected and highly influential researcher and leader in food security and nutrition policy circles in Africa, her work has been widely published in high-profile international journals and she has a significant local, regional and international network of

professionals in food security and policy design. She also actively engages in high-level global food security policy think tanks and panels.

Prof Hendriks' vision is for the Department to be ranked and recognised as the leading department in terms of the economics and social sciences related to food; agriculture and natural resource economics research; and teaching and public engagement in Africa. Her aim is also for it to be a partner of choice for international associates working in Africa.

More than that, she plans to effect transformation in at least three areas: in the demographic of staff and student bodies; the South African and African agricultural agenda, through research and teaching; and research culture, by transforming it into an engaged endeavour connected to stakeholders and driven by innovation, salience, relevance and social impact.

# First Student Support Collaboration workshop a great success

The Faculty of Natural and Agricultural Sciences (NAS) held its first and very successful annual Student Support Collaboration workshop in September this year.

This initiative was a partnership between the Faculty's student advisors and the Deputy Dean for Teaching and Learning, Prof Marietjie Potgieter. The aim of the event was to provide a platform for the student advisors, the Faculty's Student Administration Department, the newly appointed academic advisors and the NATHouse Executive Committee members to clarify the roles of all the sections with a view to advancing undergraduate student success at NAS.

The student were provided with opportunities to discuss their common experiences and to identify areas in which they needed the assistance of the academic advisors. Thereafter the members of the Student Administration Department introduced the team that deals with undergraduate degrees and highlighted frequent challenges faced in the course of their work. The representatives of the newly elected NATHouse Executive Committee then commented on how students

perceive the challenges mentioned and suggested possible solutions.

Following the presentations, an opportunity was provided for a general discussion. To facilitate productive discussions, the attendees were grouped in clusters, which each consisted of student advisors, academic advisors, student administrators and NATHouse representatives from the same cluster of disciplines. The academic advisors responded enthusiastically to the call to define their roles and help our students to reach their full potential. They eagerly engaged in asking questions and providing possible solutions to current obstacles. Finally, Prof Potgieter requested each group to give summative feedback.

The workshop ended on a high note and all those who had attended felt energised and ready to continue their tasks with renewed vigour. We would like to thank all those who were involved in organising the event and ensuring its success, as well as those who attended and contributed input. This initiative was the first of many planned for the future because **student success matters!**

*Faculty student advisors with the Deputy Dean: Teaching and Learning. From left: Ms Boitumela Seema, Ms Dolly Ayob, Prof Marietjie Potgieter, Mr Mpho Mmado and Ms Erna Gerrys*

*Representatives of the NATHouse Executive Committee who attended the workshop.*

