



UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
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SQUARED² UP

2014
December

Issue 2

Newsletter of the
Faculty of Natural and
Agricultural Sciences

www.up.ac.za



Young aardwolf on a termite mound (Photo: Philip Richardson). Read more on this on page 21.

Increased NRF ratings in NAS support the Faculty's focus on research intensiveness

The Faculty of Natural and Agricultural Sciences (NAS) is set on a trajectory path of becoming the leading research intensive science faculty on the African continent.

The Faculty is committed to producing research outputs of an exceptionally high quality and this is substantiated by the fact that almost 40% of the University of Pretoria's National Research Foundation (NRF) rated academics, come from this Faculty.

There has been a significant growth in the number of researchers recognised internationally for their contributions to science. According to the most recent NRF ratings, 151 researchers in the Faculty are rated in the respective categories. Six researchers in the Faculty are currently A-rated: Prof Nigel Bennett, Prof Don Cowan, Prof Robert (Bob) Millar, Prof Brian Rand, Prof Brenda Wingfield and Prof Mike Wingfield. Prof Yves Van de Peer, an Extraordinary Professor in the University of Pretoria's Department of Genetics and who works closely with the researchers at the Genomics Research Institute of the UP will increase this number to seven when his A-rating will become effective 1 January 2015. Prof Van de Peer is a leading academic from the University of Ghent in Belgium and one of the world's foremost bio-informaticians.

Researchers in the Faculty also attained high figures in the other NRF categories. Currently 33 of the B-rated researchers at the University are from the Faculty of Natural and Agricultural Sciences.

There are 82 C-rated researchers in the Faculty, as well as the 28 Y-rated researchers (Young researchers, 40 years of age or younger). These young researchers comprise nearly 50% of the total Y-rated researchers at UP. The Faculty can also boast with one P-rated (Young researchers younger than 35) researchers and two L-rated researchers.

More evidence of the Faculty's focus to improve its research intensiveness even more is that in terms of the ISI Web of Knowledge field rankings which measure performance on the volume and impact of research outputs. The Faculty has performed exceptionally well in a number of research fields, including the fields of Plant and Animal Sciences, Environment and Ecology, as well as Agriculture. According to the 2014 statistics, the Faculty is listed as 138/977 in terms of citations for Plant and Animal Science, 374/653 for Environment and Ecology and 357/654 for Agricultural Sciences.

The Faculty has improved its position in relation to the QS rankings in general and notably moved up its position from the 100-150 range to the 50-100 range in the field of Forestry and Agriculture, while adding Geography within the 100-150 range.

Furthermore, the Faculty has increased its high impact publications significantly with eight publications in journals with impact factor between 10 and 20 in 2013. A publication, *Nature*, with an impact factor of 38 was published in 2014, with UP as the leading organisation. In August 2014 a paper was accepted for publication in *Science*, with an impact factor of 31 and an additional *Nature Genetics* publication was accepted for publication.



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

MESSAGE FROM THE DEAN

At the frontiers of science

As one of the most diverse science faculties in South Africa, we want to strengthen our position as a premier research faculty and ensure future success by making a positive contribution to the relief of local, national and international needs. Through research, as well as teaching and learning endeavours in the Faculty, we aim to make the world a better place.

The **increased number of NRF ratings** in the Faculty support our focus on research intensiveness and proves our commitment to producing research outputs of an exceptionally high quality (read more on page 1). **Prof Yves Van de Peer**, the most recent recipient of an A rating by the National Research Foundation (NRF), is a leading academic from the University of Ghent in Belgium and one of the world's foremost bio-informaticians (see page 4).

On 10 October 2014, the International Union of Forest Research Organizations announced the appointment of **Prof Mike Wingfield** as their new President (see page 7), and **Prof Jan Verschoor** received the Innovation Hub's GAP Biosciences Biotech Fundi Lifetime Contribution Award for 2014 (see page 16).

Prof Roumen Anguelov, who has joined the Department of Mathematics and Applied Mathematics, delivered his inaugural address (see page 5) and **Dr Patricia Forbes** received the prestigious 2014 Chemical Education Award, granted by the South African Chemical Institute, for her development of an educational spectrophotometer that students can build from a kit at a fraction of the cost of an entry-level commercial spectrophotometer (see page 3).

Prof Don Cowan co-authored a *Nature* commentary in August this year on the future of Antarctic Science (page 19).

Collaboration is key to successful research and researchers from the **IFNuW** received a competitive grant from the Feed the Future Innovation Lab for Collaborative Research on Sorghum and Millet in a series of projects representing the best ideas and strategies received from around the world for addressing the problem of hunger and malnutrition in some of the world's most ruthless agricultural regions (see page 29).

Being people centred, the Faculty continuously seeks for opportunities to recruit and appoint highly recognised researchers and academics. Three new heads of department were also appointed, namely **Prof Annette Götz** (Geology), **Prof Paul Sumner** (Geography, Geoinformatics and Meteorology) and **Prof Alet Erasmus** (Consumer Science). Read more on page 40 - 42.

Prof Brian Kobilka, a Nobel Laureate, celebrated science as he delivered the keynote address at the Mandela Day Public Lecture held on 18 July 2014 (page 47).

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

As Acting Dean I would like to express my sincere gratitude for the opportunity I was given to lead the Faculty for this interim period, which I regard as an honour. This Faculty is one of the top science faculties in the country and I believe that it will continue to grow and prosper under the new leadership. The process of appointing a new dean is in an advanced stage and an announcement in this regard will be made in the next newsletter.

We wish you all well for the festive season that lies ahead and trust that you will return refreshed in 2015.

Prof Brenda Wingfield

Acting Dean: Faculty of Natural and Agricultural Sciences



Dr Forbes wins SACI award for educational spectrophotometer

Dr Patricia Forbes

Is it possible to pay a mere R600 instead of R30 000 for a spectrophotometer? This is indeed now possible thanks to the ingeniousness of Dr Patricia Forbes from the Department of Chemistry who developed an educational spectrophotometer that can be built by students themselves from a kit for a fraction of the cost of an entry-level commercial instrument.

Dr Forbes was recently announced as the recipient of the prestigious 2014 Chemical Education Award granted by the South African Chemical Institute (SACI), based on her development of this spectrophotometer (called SpecUP) in conjunction with a third-year chemistry student, Johan Nöthling, in 2012. A spectrophotometer is used to measure how much light of a particular wavelength a chemical substance absorbs. This information can be used to identify the chemical substance present or to determine its concentration.

Dr Forbes explains that “owing to the hands-on nature of the SpecUP, which has moving parts, it allows ... students to understand what is inside the ‘black box’ of commercial instruments and to discover what happens when they adjust components, which enables enquiry-based learning”. The low cost of the SpecUP allows for institutions to have more spectroscopy equipment available, which is of importance in a developing country where student numbers are typically high and resources are scarce.

The project was funded by the African Laser Centre, and the distribution of the SpecUP to other universities throughout Africa commenced in 2013 via a workshop held at the University of Pretoria, which was attended by academics from five African countries.

The SpecUP has been widely lauded as an enquiry-based educational tool and its development and implementation have gone from strength to strength. The impact of this instrument as an educational tool is evident from its use in universities in South Africa (including UP, where the SpecUP was introduced in the practical course of Analytical Chemistry III in 2013), Lesotho, Namibia, Kenya and Tunisia. The Head of the Department of Chemistry, Prof Egmont Rohwer, said “the SpecUP is a wonderful tool to improve our chemistry practical training, ideal for furthering fundamental insight into instrumental analytical techniques”. Dr Forbes added that “spectroscopy is an integral part of many undergraduate courses, in fields ranging from chemistry to pharmacy and food science. It is amazing how the SpecUP has had such an impact – there is certainly a need for educational instruments in Africa, although a teacher in Italy is even using the SpecUP in her classes!”

An article on the SpecUP spectrophotometer was published in 2014 in the *South African Journal of Science* [1], and Dr Forbes was invited to give an oral presentation and video demonstration of the instrument at the Education and Teaching in Optics and Photonics (ETOP) conference in Portugal in 2013. She was invited to present a second SpecUP workshop in Tunisia in March 2014, which was attended by diverse academics, as well as postgraduate and undergraduate students.

Dr Forbes has been invited to return to Tunisia in March 2015 as one of the presenters in the “Lighting up Africa with Lasers, Optics, and Fibres” workshop to be held in celebration of the International Year of Light (see <http://www.light2015.org/Home/Event-Programme/2015/Workshop/Lighting-up-Africa-with-Lasers--Optics--and-Fibres.html>). She has also been selected as one of the scientists to be featured in the *Women in Optics* planner published by SPIE, the international society for optics and photonics technology.

Reference:

[1] Patricia BC Forbes & Johan A Nöthling (2014). Shedding light on spectrophotometry: the SpecUP educational spectrophotometer. *South African Journal of Science*, 110(1/2):1-5. [Online] Available at <http://dx.doi.org/10.1590/sajs.2014/20130096>



Dr Patricia Forbes with some of the Chemistry students using the SpecUP

Another UP researcher receives an A rating from NRF

Prof Yves Van de Peer, the University of Pretoria's (UPs) most recent recipient of an A rating by the National Research Foundation (NRF), is a leading academic from the University of Ghent in Belgium and one of the world's foremost bioinformaticians.

His research in the field of genetics includes plant, animal, microbial and environmental genomics. He is contracted by the UP Department of Genetics in the Faculty of Natural and Agricultural Sciences and works closely with the researchers of UPs Genomics Research Institute. Prof Van de Peer is credited with an impressive array of publications.



Prof Yves Van de Peer

BFAP receives Inspiration Award from Grain SA

The Bureau for Food and Agricultural Policy (BFAP), with offices located at the University of Pretoria, the University of Stellenbosch, and the Western Cape Department of Agriculture recently received an Inspiration Award from Grain SA at the Grain Producer of the Year function.

This award is presented to individuals or organisations in appreciation of their excellent contributions to the grain industry. They excelled at achieving extraordinary results in their respective fields, as well as inspiring the industry to be more competitive in its commitment to excellence.

Founded in 2004, the BFAP consists of 45 public and private sector analysts and experts who pool their knowledge and research to inform decision-making within South Africa's food and beverage sector. The BFAP has become a valuable resource to the agro-industrial complex by providing analyses of future policy and market scenarios and measuring their impact on farm and firm profitability. The BFAP is also partnering with various international institutions and is part of the newly established Regional Network of Agricultural Policy Research Institutes (ReNAPRI) in Eastern and Southern Africa. National and multinational private sector entities, as well as government in all spheres consult the Bureau.



Mr Andries Theron, Deputy Chairman of the Grain Farmers' Organisation, Grain SA, congratulates Prof Ferdi Meyer, Director of the BFAP.

Prof Roumen Anguelov delivers his inaugural address

Mathematics: a Method of Analysis and Discovery was the topic of Prof Roumen Anguelov's inaugural address delivered during July this year. Prof Anguelov was appointed as the new Head of the Department of Mathematics and Applied Mathematics in the Faculty of Natural and Agricultural Sciences in 2013. He has a keen interest in Dynamical Systems, Mathematical Modelling and Numerical Analysis.

He enjoys considerable international recognition as a researcher, which is substantiated by his B3 rating awarded by the National Research Foundation (NRF).

In his address Prof Anguelov argued that "Mathematics is a discipline fundamental to knowledge. In the contemporary world advancement in any area of human activity typically has a substantial mathematical component. The philosophical discussion motivated by this observation is yet (if ever) to reach any conclusions. In the meantime, Mathematics

is becoming one of the primary instruments of investigation in many areas of human endeavour, e.g. Biology, Finance, Marketing, Sport Science, Medicine, Public Health, Economics, Psychology, and Music, to mention but a few in addition to the well-known "sister sciences, among others Physics, Statistics, and Computer Science."

Prof Anguelov added that Mathematics itself is growing with the development of new concepts and theories being motivated by such applications. He also shared some of his personal experiences and contributions in three such areas: Mathematical Physics, Scientific Computing and Biomathematics. He also stipulated his vision for the Department of Mathematics and Applied Mathematics as being in the context of the University's goals as well as the needs of our society where a lack of Mathematics and Education in Mathematics exists and are recognised as major impediments to development.



From left: Prof Anton Ströh (Former Dean: Faculty of Natural and Agricultural Sciences, now Vice-Principal: Institutional Planning), Prof Roumen Anguelov and Prof Themba Mosia (Vice-Principal: Student Affairs and Residences).

SASAS awards Gold Medal to Prof Carl Roux



Prof Michiel Scholtz (President of SASAS) and Prof Carl Z Roux at the official award ceremony

Prof Carl Z Roux (76), an emeritus professor of the Department of Genetics at the University of Pretoria, was recently awarded a gold medal by the South African Society for Animal Science (SASAS) in acknowledgement of exceptional services rendered in furtherance of animal science over many years.

Prof Roux's work on the theoretical basis of growth and efficiency with application to genetics, breeding goals and nutrition is well known and internationally accepted, which has contributed to him being regarded as the doyen of South African theoretical population genetics and its physiological basis.

He obtained his BSc(Agric) and MSc degrees in Genetics at Stellenbosch University and completed his PhD in Animal Breeding and Statistics at the Iowa State University under professors Kempthorne and Hazel in 1969. His PhD thesis led to a 1974 paper in *Theoretical Population Biology*, which renowned researchers in the field considered 'elegant', 'very powerful' and 'a notable contribution' to the topic of selection in the case of many gene loci. This work also led to an invitation as a salaried research associate of Iowa State University.

After having done research at the former Animal and Dairy Science Research Institute from 1969 to 1990, Prof Roux started doing theoretical work on animal growth and efficiency, which found considerable application in nutritional research. Six PhD theses and

six MSc dissertations as well as many publications of colleagues flowed from, or were based on, his mathematical description of growth and efficiency. His work also led to his receiving several awards, including a silver medal from SASAS in 1982 for exceptional meritorious and original research on animal science and the President's Award for Service to Animal Science from SASAS in 2002.

From 1991 to 2002 he served as professor and from 2003 to 2012 as an extraordinary professor and since then as a senior research fellow at the University of Pretoria. During his professorship he was main supervisor to six PhD and 14 MSc students.

In his career, Prof Roux was invited to international congresses, was a member of the Permanent International Committee for Congresses on Genetics Applied to Livestock Production, was on the editorial board of the *South African Journal of Animal Science* and acted as a reviewer for the *British Animal Science Journal*, the *European Livestock Production Science Journal*, the *South African Journal of Science* and the *South African Journal of Plant and Soil*.

Prof Roux was a member of the South African Statistical Association, the South African Genetics Society, and the South African Plant Breeders Association, and is currently an honorary member of the South African Society for Animal Science.

IUFRO appoints Prof Mike Wingfield as new President

The International Union of Forest Research Organizations (IUFRO) announced the appointment of Prof Mike Wingfield as new President on 10 October 2014. IUFRO's International Council elected him during a meeting at the 24th IUFRO World Congress, which was held in Salt Lake City, Utah, United States. Mike Wingfield follows up Prof Niels Elers Koch who served IUFRO – the only worldwide organisation devoted to forest research and related sciences – as President for the past four years.

"We successfully strengthened global networking in forest science served by a well-functioning IUFRO Headquarters, Board and Management Committee. We held the first-ever IUFRO Regional Congress for Africa in 2012 in Kenya and another IUFRO Regional Congress in Latin America in 2013 in Costa Rica," said Niels Elers Koch summarising some of IUFRO's major achievements during his time as President. He also noted with pleasure a strengthened collaboration with the International Forestry Students' Association (IFSA), among other global alliances.

Prof Wingfield, IUFRO's incoming President, said: "Much as IUFRO has enriched my life so deeply, it is my wish that the same will be true, particularly for the many young forest scientists in the world". He particularly highlighted IUFRO's special relationship with IFSA and his commitment to build this bond as actively as possible in the future. He also referred to IUFRO's great responsibility as the global network for forest research "to provide solid and reliable data that will underpin some of the most important decisions relating to our fragile and highly threatened world. He added: "Never before has the world relied so heavily on its natural resources and emphasised the essential role of forests for a sustainable future of our planet.

Prof Wingfield, Professor and Founding Director of the Forestry and Agricultural Biotechnology Institute (FABI) of the University of Pretoria was involved in IUFRO activities for more than 30 years. He has served as IUFRO Vice President in the 2010-2014 Board term. As a researcher, he is broadly interested in the health of trees and has conducted research

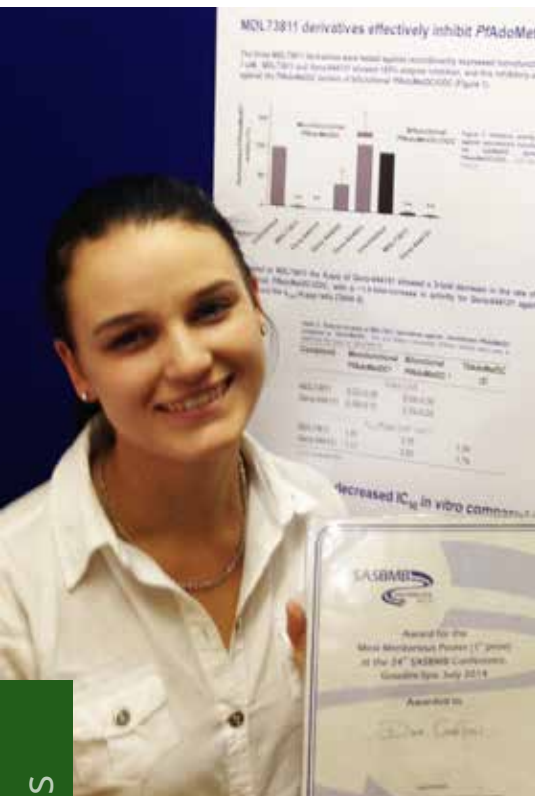


IUFRO's immediate past President Niels Elers Koch, Denmark (left) with newly elected IUFRO President Mike Wingfield, South Africa. (Photo by Ramin Khorchidi/IUFRO).

on tree pests and pathogens. He is a fellow of various scientific societies including the Royal Society of South Africa and the American Phytopathological Society. He has received honorary doctorates from the University of British Columbia, Canada, and North Carolina State University and received the highest scientific award (Kwame Nkrumah Scientific Award) from the African Union in 2013.

The 24th IUFRO World Congress, entitled "Sustaining Forests, Sustaining People: The Role of Research" (<http://iufro2014.com/>)

aimed at showcasing the scientific expertise and activities in current forest research to address the range of sustainability challenges and opportunities. It was organised by the International Union of Forest Research Organizations (IUFRO) and hosted by the US Department of Agriculture Forest Service in cooperation with the National Association of University Forest Resources Programs (NAUFRP), the Society of American Foresters (SAF), and the Canadian Institute of Forestry (CIF/IFC).



Dina Coertzen

Postgraduate Biochemistry student won first prize at SASBMB

Dina Coertzen, a PhD student in the Department of Biochemistry in the Faculty of Natural and Agricultural Sciences, recently won the first prize (award for the most meritorious poster) at the 24th Conference of the South African Society for Biochemistry and Molecular Biology (SASBMB).

The poster title was 'Novel S-adenosylmethionine decarboxylase inhibitors as potent antiproliferative agents against *Plasmodium falciparum*'. Dina is part of the Malaria Parasite Molecular Laboratory (M²PL) under supervision of Prof LynMarie Birkholtz (DST/NRF South African Research Chair in Sustainable Malaria Control). This work falls under the UP Centre for Sustainable Malaria Control where Dina served as the student forum chairperson.

During her PhD she discovered unique structural properties of the AdoMetDC protein in *P. falciparum* malaria parasites. Her work enabled the first functional descriptors of the core structure of this protein and revealed the potential of AdoMetDC as a drug target. Exploitation of these structural and functional characteristics allowed the candidate to identify a highly active compound specifically targeting *P. falciparum* AdoMetDC. The combination of this compound with a novel nanovector-based delivery system significantly improved the potency of this new compound against *P. falciparum* parasites, which can lead to the development of this nanodrug as a novel antimalarial therapeutic strategy.

Former NAS Dean and Rector named Sunday Times Business Leader of the Year

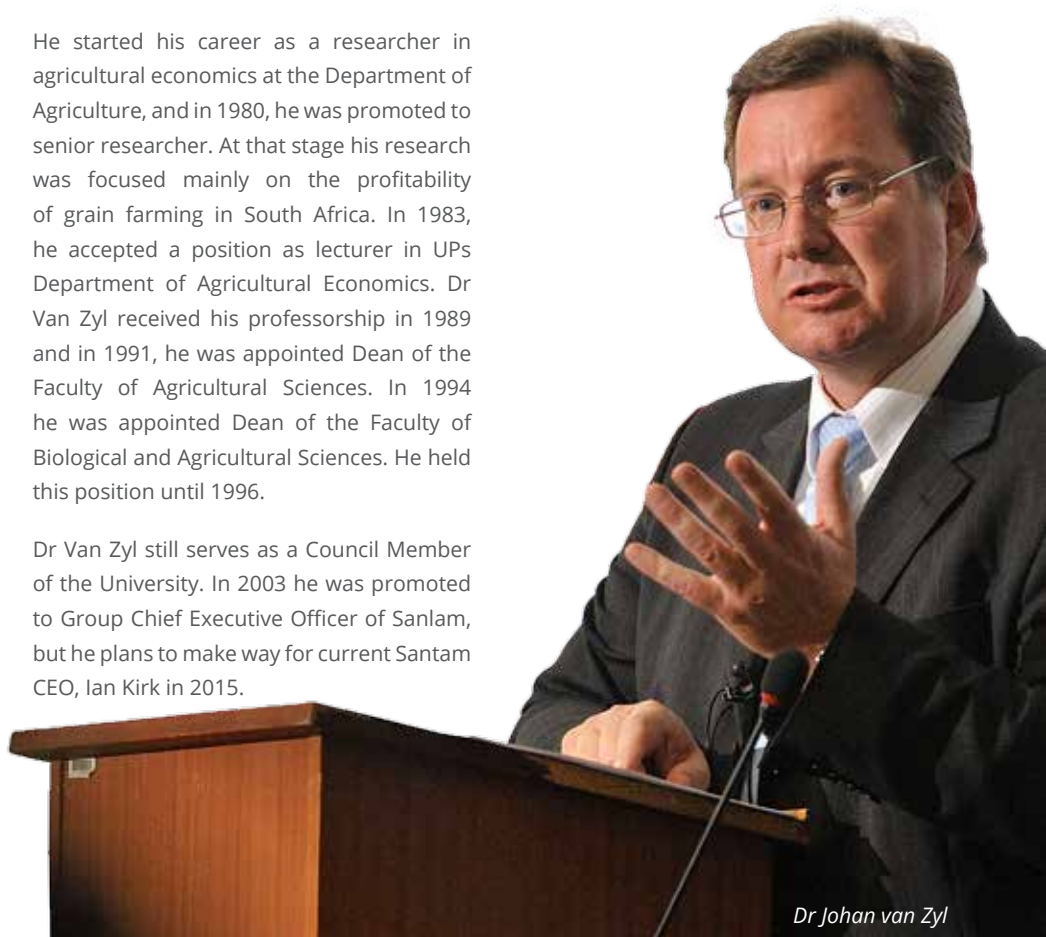
Dr Johan van Zyl, former Vice-Chancellor and Principal of the University of Pretoria and former Dean of the Faculty of Natural and Agricultural Sciences was named Sunday Times Business Leader of the Year in October this year. The Sunday Times Business Leader of the Year award is a prestigious accolade bestowed on recipients voted for by executives of the top 100 companies of the previous year.

On accepting the award, Dr Van Zyl, who is currently the Group Chief Executive Officer of Sanlam, expressed his gratitude, saying: 'It is a great honour to receive this award, particularly as it is the result of a voting process by peers. In business it is about people and the team, probably more so in insurance, where you do not sell a physical product, but a promise. This promise is only as good as the people making it.'

Dr Johan van Zyl was elected as Vice-Chancellor and Principal of the University of Pretoria in 1996 and held the position until 2001, when he was appointed Chief Executive Officer of Santam Limited.

He started his career as a researcher in agricultural economics at the Department of Agriculture, and in 1980, he was promoted to senior researcher. At that stage his research was focused mainly on the profitability of grain farming in South Africa. In 1983, he accepted a position as lecturer in UPs Department of Agricultural Economics. Dr Van Zyl received his professorship in 1989 and in 1991, he was appointed Dean of the Faculty of Agricultural Sciences. In 1994 he was appointed Dean of the Faculty of Biological and Agricultural Sciences. He held this position until 1996.

Dr Van Zyl still serves as a Council Member of the University. In 2003 he was promoted to Group Chief Executive Officer of Sanlam, but he plans to make way for current Santam CEO, Ian Kirk in 2015.



Dr Johan van Zyl

National Research Foundation honours two professors for their A-ratings

Prof Brenda Wingfield, the Acting Dean of the Faculty of Natural and Agricultural Sciences and Prof Mike Wingfield from the University's Forestry and Agricultural Biotechnology Institute (FABI), have both been honoured by the National Research Foundation (NRF) for their A-ratings.

Prof Brenda Wingfield was elected to serve on the Council of the Academy of Science of South Africa (ASSAf) for the 2012 to 2016 cycle. She is also the secretary general of the International Society for Plant Pathology (ISPP). She published more than 300 peer-reviewed articles. Prof Wingfield is one of the Research Leaders of the Department of Science and Technology (DST)/NRF Centre of Excellence in Tree Health Biotechnology, past Chairperson of the National Science and Technology Forum (NSTF) and previous Vice-Chairperson of the Board of Trustees of PlantBio, one of the national biotechnology innovation centres.

Her research interests include fungal population genetics and fungal phylogenetics. In addition to her internationally recognised research programme on the molecular phylogeny and taxonomy of tree pathogenic fungi, she is now developing a fungal genomics programme.

In excess of thirty years, Prof Mike Wingfield conducted research on tree pests and pathogens especially concerning their global movement. His highly cited research in this field, conducted in many different countries of the world has led to the discovery of some of the most important pathogens of trees grown commercially in plantations.

Based on his research reputation, he has been a long term advisor of many major forestry corporations globally. Amongst his most important contributions to forestry has been the role he has played as an advisor to more than 50 PhD students, many of whom now hold very senior positions globally.

Prof Mike Wingfield has published widely on the topic of tree health in more than 600 research papers, five books and in numerous prestigious invited presentations globally. He serves in many distinguished positions and has received numerous awards and honours for contributions to education, research and industry, in South Africa and elsewhere in the world. He was also elected to serve as the next President of the International Union of Forestry Research Organisations and is the first ever African to be elected to this prestigious position, which has a five-year term running from October 2014 to October 2019.



Prof Brenda Wingfield and her husband, Prof Mike Wingfield receives acknowledgment for their A-ratings from the NRF.

Two female scientists acknowledged at WISA



Cynthia Joan Henley-Smith (Photo: Maja Sakkers)

Two women currently busy with their doctoral studies in the Faculty of Natural and Agricultural Sciences received fellowships of R40 000 each at the 2014 "Women in Science Awards" (WISA) of the Department of Science and Technology earlier this year. The awards were presented at a gala event in Johannesburg during August this year.

The Department of Science and Technology (DST) hosts these awards annually in order to reward excellent female scientists and researchers, and encourage younger women to follow in their footsteps.

Lungile Sitole is studying biochemistry and is part of a research group working towards the discovery and development of novel markers which could be used to monitor how HIV disease progresses in patients and how they respond to treatment. **Cynthia Joan Henley-Smith** is a botanist investigating the potential of indigenous plants to yield medicinal products, specifically for oral care.

Lungile received a BSc degree in Chemistry (Magna Cum Laude) from Jackson State University, Jackson Mississippi (USA) in 2007. She received the Research Initiative for Scientific Enhancement (RISE) funding for undergraduate research and was awarded a place on the President's and the Dean's merit list in 2005, 2006 and 2007. In 2007, she was awarded the Louis Stokes Mississippi Alliance for Minority Participation (LSMAMP) Bridge to the Doctorate fellowship in recognition of academic excellence. She then completed her MSc (Cum Laude) in Organic Chemistry from the same institution in 2009. As a student, Lungile conducted research at several institutions which include the Council of Scientific and Industrial Research (CSIR), Adcock Ingram Pharmaceuticals and Indiana University-Bloomington (USA).



Lungile Sitole

Lungile is currently a PhD student in the Biochemistry department at the University of Pretoria, under the supervision of Prof Debra Meyer. Her research interest lies in poverty-related diseases, specifically HIV/AIDS. Their research group has a unique approach to HIV research and education, which involves multi-disciplinary collaboration. Sitole's project entails the use of bio analytical and biophysical techniques in the detection and identification of dysregulated metabolites in HIV infection. The potential outputs of this research are the discovery and development of novel markers which could be used as indicators of HIV disease progression and treatment response. Lungile has published a review and a research article in international peer-reviewed journals.

Cynthia Joan Henley-Smith obtained her BSc (Honours and Master's) in medicinal plant science with distinction from the University of Pretoria. Alongside which, she also completed a two year diploma in cosmetic science. She is currently involved with her doctoral studies in the Faculty of Natural and Agricultural Sciences, on the biological activity of *Heteropyxis natalensis*, an indigenous South African plant, against oral pathogens using a novel predictive method. She is also working as a part-time lecturer in Plant Science and Microbiology at Midrand Graduate Institute.

During her studies she developed a novel method for determining the anti-adherence effect of plants on bacteria using a scanning electron microscope. Recently she has successfully developed and tested a novel approach to predicting the influence of multiple components on microbial inhibition using a logistic response model.

Food Scientist receives International Award for leadership

Dr Patrick Njage of the Department of Food Science and postdoctoral fellow of the Institute for Food, Nutrition and Well-being (IFNuW), was a recipient of the International Union of Food Science and Technologies (IUFoST) Young Scientist Award for 2014. Alongside seven other outstanding young food scientists from across the world, Njage received the award at the IUFoST's 17th World Congress of Food Science and Technology (World Food Congress), held in Montreal, Canada in August this year.

IUFoST is a country-membership organisation that aims to strengthen the role of food science and technology by helping to secure the world's food supply and eliminating world hunger. The recipients of these awards are all younger than 35 years old and are recognised as future leaders in the field of food science research. At this year's World Food Congress, all the young scientists were given the opportunity to present their research to an international audience. During a series of workshops they were also able to mentor other scientists on, for example, leadership issues and career development.

Njage was recognised by IUFoST for his research into the 'Quantitative risk of antimicrobial resistant gene transfer from bacteria in vegetables to the human colon using in-vitro models' under the supervision of Prof Elna Buys. In simpler terms, Njage used gut models to investigate the role of irrigation water in the transmission of resistant *E. coli* to lettuce, and its effects in the human gut. While antimicrobial drugs, commonly known as antibiotics, which are found in human medicine and animal food produce, are used to fight bacterial infections, some bacteria have maintained genes that are resistant to these antibiotics. Antibiotic resistance results in antibiotics not having the desired effect on bacteria. Although certain new-generation antibiotics have been effectively used to treat resistant *E. coli*, these antibiotics are rendered inactive by specific bacterial enzymes.

What makes Njage's study exemplary is his investigation into the presence of these bacterial enzymes in bacteria that contaminate vegetables, which few researchers have previously explored. His study found that *E. coli* from lettuce showed potential as agents that maintain and transfer resistance genes to potential intra- and extra-intestinal pathogenic *E. coli*. This research is important, as many of these potential carrier vegetables are consumed raw, and some of these strains of *E. coli* can cause diarrhoea, anaemia, kidney failure and even death in humans. Other strains may cause urinary tract or other infections.



Dr Patrick Njage

Without efforts to stop the maintenance and transfer of genes that are resistant to such *E. coli*, Njage fears that we may fall back into a pre-antibiotic era, which will lead to many deaths caused by pathogenic diseases. The discovery of newer-generation antimicrobials to be used against such *E. coli* seems a less viable solution as several large pharmaceutical companies have left the antibacterial and antifungal therapeutic arenas, which has resulted in limited scientific expertise in the field of antimicrobial discovery and development. Displaying true leadership qualities, Njage called on authorities to take the necessary steps, which are to make funding available for research into the reduction of the proliferation of resistant genes and create awareness of the importance of water hygiene.

Njage intends to do further research at the UP Department of Food Science through risk modelling, using mathematics to predict how genes will be affected by antibiotics, a technique in which he was trained during his time spent at the University of Ghent, Belgium.

He also hopes to start his own group to conduct research on a theme related to microbiology and biotechnology. Although he has studied and worked all over the world, Njage says he would be honoured to continue his work at UP, because it is an institution that enables research. He is currently supervising several postgraduate theses at UP and other universities, both in and outside of South Africa, leading and mentoring individuals who are aspiring to work in the field of food science.

Top postgraduate student wins Biotech Fundi Award

Dr Steven Hussey, a postdoctoral fellow in the Department of Genetics and the Forestry and Agricultural Biotechnology Institute (FABI) in the Faculty of Natural and Agricultural Sciences was recently awarded a Biotech Fundi Student Award for his PhD research.

The Gauteng Department of Agriculture and Rural Development (GDARD), in partnership with The Innovation Hub, hosted the Annual Biotech Fundi Awards, recognising the biotech community of Gauteng. The awards ceremony brought together various biotechnology role players and stakeholders, with the sole objective of recognising achievements and excellence in the sector.

Dr Hussey was awarded a Biotech Fundi globe trophy, a certificate, a R5 000 cash prize, course attendance and training at DNA biotech to the value of R10 000, as well as a trip to Saskatoon, Canada, in October 2014, to attend the Agricultural Bioscience International Conference.

He recently completed his PhD research in the Department of Genetics and graduated in September this year. Being a Mandela Rhodes Scholar, he was the top student throughout his undergraduate and postgraduate studies in the Faculty of Natural and Agricultural Sciences, passing all undergraduate courses and postgraduate programmes with distinctions (many of the with an average of above 90%). He was also awarded the South African Genetics Society Hofmeyr-Van Schaik Prize for the best fourth-year student in Genetics. His PhD research resulted in three published peer-reviewed papers (one a co-authored paper in the journal *Nature*) and two additional submitted manuscripts in high-impact journals.

His PhD research was presented at five international plant and tree biotechnology conferences. Dr Hussey's PhD research, which was co-funded by Sappi and Mondi, focused strongly on biotech approaches to manipulating woody biomass traits for pulp, paper and chemical cellulose production in *Eucalyptus* trees. In part, he identified the gene targets of a transcription factor associated with cellulose biosynthesis during fibre secondary cell wall formation, and showed that its overexpression altered *Eucalyptus* fibre cell wall properties. This gene has potential application in woody biomass biotechnology, and is currently being assessed in transgenic poplar trees. The vast scale at which *Eucalyptus* is planted and its importance for the future South African Bio-economy makes this PhD finding highly relevant to the Biotech sector. Dr Hussey also pioneered the application of a cutting-edge genomics technology (ChIP-seq) in field-grown *Eucalyptus* trees, producing the first genomic profile of a modified histone (H3K4me3) in developing xylem tissue and uncovering a poorly understood level of transcriptional regulation of xylem development in trees. Together, these findings open new avenues for wood biotechnology towards bioenergy and biomaterials production from plant biomass.

Among the 10 UP students who received GDARD bursaries in 2013 Drew Behrens, also from FABI won the top student award. Drew is currently busy with his BSc Honours degree in the FMG group.

In 2013, Prof Dave Berger and Dr Eschar Mirsachi, both from the Faculty of Natural and Agricultural Sciences, respectively won the Capacity Builder and Top Student awards.



Dr Steven Hussey

UP wins first prize for best exhibition at Sasol Techno X

The elated team from Sci-Enza receiving the first prize for the best exhibition at the Sasol Techno X career expo



The University of Pretoria (UP) took first prize for the best exhibition in the University category at the annual Sasol Techno X career expo at the Sasol ChemCity Eco Industrial Park in Sasolburg in August. This year's theme was 'Today's minds, tomorrow's future'.

The annual Sasol Techno X – now in its 14th year of existence – aims to make the many facets of technology known, and to encourage learners to explore the wide range of exciting disciplines and career choices that mathematics, science and technology can offer. This career expo is one of the largest career guidance exhibitions of its kind in the country. It attracts more than 24 000 visitors from seven provinces every year, among them Grades 7 to 12 learners from more than 300 schools. Sixteen tertiary education and training institutes and over thirty businesses and organisations presented exciting exhibitions, workshops, talks and science shows to make visitors aware of career options and to encourage learners to obtain academic qualifications in science and technology and to pursue their dream careers in these fields.

Sci-Enza and JuniorTukkie represented the University at this prestige expo. Their exhibition, a vegetable garden in the exhibition tent, represented a combination of two themes: the theme of Sasol Techno X and the sub-theme 'Plant today to empower people for a better tomorrow' declared by the UN for the 2014 International Year of Family Farming. With five tons of soil, about 3 000 seedlings, a few trees and some flowers, Mr Petrus Lombard, Mrs Rudi Horak and

the Sci-Enza interns created a stunning 'TUKS community garden' in a tent. The message of the exhibition was not only to promote careers associated with agricultural sciences, but also to provide a link between all the faculties related to food production, food security, engineering, legislation and the economy. Petrus Lombard, Juan Thomaïdes and George Dywili from the JuniorTukkie office were available to answer any questions about UP's admission requirements, study fields and student applications. Promotion pamphlets and faculty brochures were also made available.

Sci-Enza exhibited several fun hands-on 'science gardens' where visitors could discover mechanical, mathematical and scientific principles. The Sci-Enza team presented 46 science shows and 33 workshops during the week. The gardens created a unique and relaxed atmosphere that attracted much interest from visitors of all ages.

The best part of the exhibition was probably that all the vegetable plants were donated to the temporary workers employed at the venue. Also, the two vertical pallet gardens were donated to the Sasolburg High School.

We want to thank SASOL for their R20 000 sponsorship, Sakata Seed for donating 3 000 vegetable seedlings, packets of seeds and workshop resources, the Faculty of Natural and Agricultural Sciences for its sponsorship, and the office of Dr Pieter Clase for the financial contribution that made this exhibition possible.



Petrus Lombard assisting with preparing the TUKS community garden at the Sasol Techno X career expo



Grade 7 to 12 learners investigating several hands-on 'science garden' exhibits to discover mechanical, mathematical and scientific principles

Twin taxonomic appointments on international commissions for two UP microbiologists



Prof Fanus Venter and Dr Wilhelm de Beer

Two staff members of the Department of Microbiology and Plant Pathology in the Faculty of Natural and Agricultural Sciences and researchers associated with FABI, were recently elected to serve on the international bodies governing bacterial and fungal taxonomy. Prof Fanus Venter, Head of the Department of Microbiology and Plant Pathology, was elected to the Executive Board of the International Committee on Systematics of Prokaryotes (ICSP), while Dr Wilhelm de Beer was elected to the International Commission on the Taxonomy of Fungi (ICTF). They are the only South Africans who currently serve on these committees.

Prof Venter was elected to the ICSP at the recent International Meeting of Microbiological Societies (IUMS), held in Montreal, Canada. The ICSP consists of nine board members and essentially directs and guides *prokaryote* systematics. This committee, amongst others, oversees the nomenclature of *prokaryotes*, determines the rules by which *prokaryotes* are named and is responsible for revising the Bacteriological Code. They also govern the implementation of this Code, determine which names are validly published (or may be validly published), and oversees the publication of the *International Journal of Systematic and Evolutionary Microbiology*. In order to be validated, all new names and combinations have to appear in this journal. It is the first time that a South African will serve on the Executive Board since its formation in 1939.

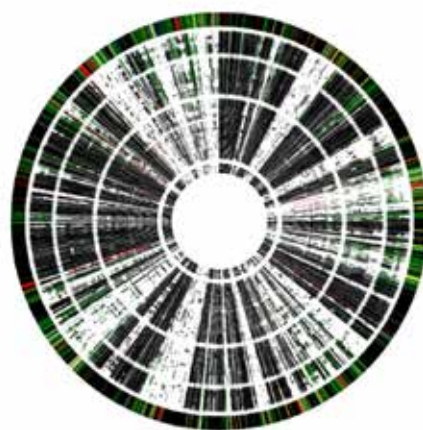
The primary research interests of Prof Venter include bacterial evolution, systematics and diversity. He is specifically interested in how knowledge of these aspects of bacteriology can be applied to answer specific research questions related to the functioning of bacteria and bacterial communities in different environments. During the past few years his research group has focused mainly on the use of molecular, sequencing and genomics approaches when addressing these questions. The two main focus areas are bacteria associated with plants and those occurring in aquatic environments.

Dr De Beer was elected to the ICTF at the recent International Mycological Congress (IMC) in Bangkok, Thailand. The ICTF has the responsibility of promoting and guiding the science of fungal taxonomy. It acts under the auspices of the International Union of Microbiological Sciences (IUMS) and the International Mycological Association (IMA) (of which Dr De Beer is also a board member). The activities of the ICTF are closely aligned with the Nomenclature Committee for Fungi, for which Dr De Beer serves on the Special Subcommittee on Governance of the Code with respect to Fungi. The latter subcommittee guides nomenclatural issues in fungi and advises the editorial committee of the International Code of Nomenclature for Algae, Fungi, and Plants (ICN) with regard to issues relating to fungi.

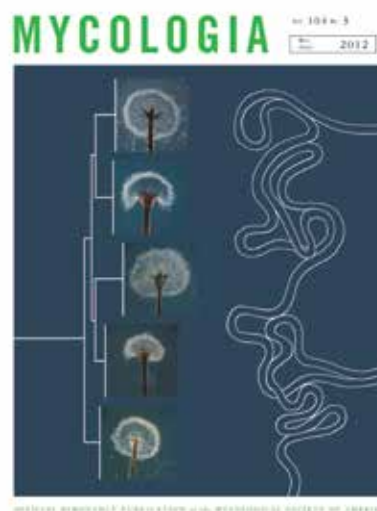
Dr De Beer's research focuses on fungal plant and human pathogens belonging to the *Ophiostomatales* and *Microascales* (Ascomycetes). These orders include species from well-known genera, such as *Ophiostoma*, *Leptographium*, *Sporothrix*, and *Ceratocystis*. Although his major focus is on resolving the taxonomy at all levels in these groups, he also has a keen interest in fungus-insect symbioses, the pathogenicity of these fungi to trees and humans, and the degradation of timber. Dr De Beer was recently informed that he was awarded a B2-rating by the NRF during the 2014 cycle of ratings.

Both these researchers agree that although some people might consider taxonomy an old-fashioned science, there has never been a more exciting time to be working in the field of microbial taxonomy. "During the past 20 years the availability of DNA sequences, and more recently environmental and whole genome sequences, has revolutionised our understanding of the evolutionary relationships between fungal and bacterial species, which to a large extent enhance our ability to resolve complex taxonomic questions," says Prof Venter. Dr De Beer is of the opinion that "the major challenge that the two commissions face, is to ensure that the rules that govern the taxonomy of these organisms remains concurrent with the DNA revolution, because applying outdated rules to modern concepts is like pouring new wine into old wineskins."

They conclude that "taxonomy forms the foundation of almost every other field of biological research, and especially of accurate diagnostics. The species name of a microbial pathogen or symbiont of a tree, animal or human, is the key to all information about that organism. Our job is to make sure that the most appropriate genus and species names are being used in the scientific literature."



Genome comparison of *P. ananatis* with the genomes of several closely related member of the family Enterobacteriaceae.



An article on the taxonomy of a fungal tree pathogen, *Grosmannia serpens*, written as part of the PhD thesis of Tuan Duong, a student of Dr de Beer, was featured as the cover story for the American journal *Mycologia*. In this article they showed with DNA sequence data of five gene regions that what was once considered a single fungal species, actually consists of five different species.

Biotech Lifetime Fundi Award bestowed on Prof Jan Verschoor

The Innovation Hub's GAP Biosciences recently awarded Prof Jan Verschoor, a renowned researcher in biochemistry the Biotech Fundi Lifetime Contribution Award for 2014.

Prof Verschoor received the Award for his contributions over the past 30 years in the field of biochemistry. These contributions include that Prof Verschoor was the first person to establish the technology for monoclonal antibody production in South Africa in 1983. He was also responsible for the application of monoclonal antibodies to the development of a new chicken vaccine against Infectious Coryza in 1997. He invented a new principle for the diagnosis of human tuberculosis (TB), patented in 2005. Furthermore he was instrumental in the establishment of the University of Pretoria's roll-out company "MARTI TB Diagnostics" in 2014 to develop the TB diagnostic device for commercialisation after winning first prize in the Gauteng Accelerator Programme (GAP) Biosciences 2013 business plan competition. All these achievements were made possible by a large number of brilliant students who studied under Prof Verschoor and became co-authors, prize winners, co-inventors and project coordinators in biotechnology.

Prof Jan Verschoor was the Head of the Department of Biochemistry from 2003 to 2011 in the Faculty of Natural and Agricultural Sciences. He was responsible for focusing the research of the Department on the diagnosis, prevention and cure of human and animal infectious diseases, in particular aiming at the big three poverty related infectious diseases of Africa, namely AIDS, TB and Malaria. One of the highlights created by this focus towards the ideal of curbing these killer diseases was the appointment of Prof Debra Meyer as renowned HIV specialist researcher.

Since 1995 Prof Verschoor's Tuberculosis research team has invented five patents, all filed internationally on innovative TB diagnostics and therapy.



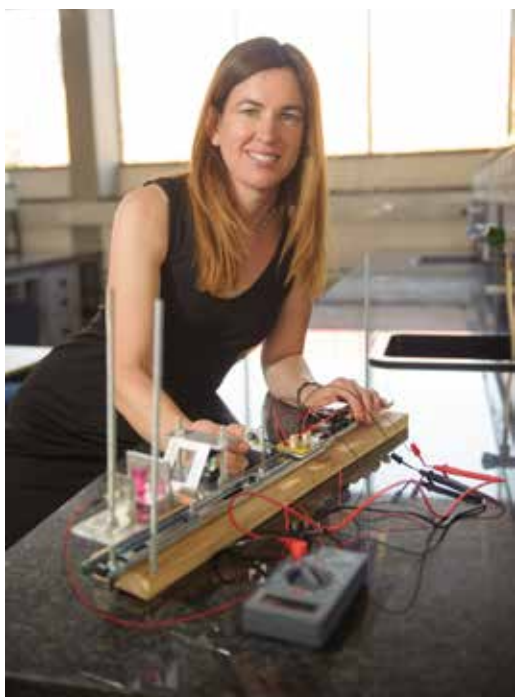
Prof Jan Verschoor

Department of Chemistry academic wins prize

Dr Patricia Forbes was awarded the prize for the Best Scientific Paper at the recent National Association for Clean Air Conference, held in Umhlanga during October.

Dr Forbes presented a paper, titled 'Air-dispersion modelling: A South African pesticide validation case study', which was co-authored by her MSc student, Sifiso Nsibande and collaborators from the CSIR (Dr James Dabrowski) and the Agricultural Research Council (Etienne van der Walt and Annette Venter). Sifiso Nsibande also won two student awards at the recent Analitika Conference, where he presented aspects of this research.

In their research, undertaken to validate a model to predict pesticide spray drift, the team used the active ingredient as a tracer. This was the first research of its kind in South Africa. Airborne pesticide concentrations were determined by sampling done to a range of 400 m from the field where the pesticide was applied, which allowed the validation of the model (AGDISP from the USA) at greater distances than before. The research revealed important factors in minimising spray drift, which can be employed to reduce farmers' costs related to off-site application, and also to prevent environmental contamination.



Dr Patricia Forbes

PhD student awarded SABS Young Standards Professional 2014

Ms Victoria Rautenbach, a PhD Geoinformatics student in the Department of Geography, Geoinformatics and Meteorology, won the SABS Young Standards Professional Award for 2014.

The award was presented at the SABS Quality Awards Gala Dinner in the Sandton Convention Centre early in October this year. With this award the SABS (www.sabs.co.za) honours an exceptional contribution to the Standards Development fraternity. The development, maintenance and promotion of South African standards by the Standards Division of the SABS is an important contributor in addressing the socio-economic development priorities of the country.

At the age of 26, Victoria already holds a leadership position in ISO/TC 211, *Geographic Information/Geomatics*, and actively participates in its local mirror committee, SABS/TC 211, *Geographic Information*. She is the South African nominated expert on several projects, including the revision of ISO 19103, *Geographic information – Conceptual Schema Language*, and ISO 19119, *Geographic information – Services*, and has represented South Africa on several editing committees, including ISO 19101-1, *Geographic information – Reference model – Part 1:*

Fundamentals, ISO 19150-1, *Geographic information – Ontology – Part 1: Fundamentals*, and ISO 19154, *Geographic information – Ubiquitous public access – Reference model*.

Victoria's most significant contribution to ISO/TC 211 is in the field of outreach activities. She was the online presence for ISO/TC 211 for several years, responding to online queries on their Facebook site and informing the world about ISO/TC 211 work on Twitter. She presently chairs of the Advisory Group on Outreach and arranged a first 'Standards in Action' workshop during the ISO/TC 211 plenary week in Berlin, Germany, during June 2014.

Victoria is busy with her PhD in Geoinformatics, with the topic 'Three dimensional geovisualisations'. Her promoters are Prof Serena Coetzee from the Centre for Geoinformation Science at UP and Dr Arzu Çöltekin from the University of Zürich. In 2013, she completed an MSc in Geoinformatics on the topic: The orchestration of standard geospatial web services (amongst others, ISO 19128:2005) to produce thematic maps in a geoportal of a spatial data infrastructure. She also holds BSc (Hons) Geoinformatics and BSc Computer Science degrees.



Victoria Rautenbach (right) receiving her award from Ms Jodi Scholtz; Group Chief Operating Officer: Department of Trade and industry.

How to make a hobby and science meet

'Choose a job you love and you will never have to work a day in your life,' said Confucius. This advice seems to have been taken to heart by Prof Johann Kirsten, Head of the Department of Agricultural Economics, Extension and Rural Development and the brain behind the registration of Certified Karoo Lamb. What initially started during a sabbatical as an interesting departmental research project with international collaborators has led to cross-disciplinary research across the UP campus and has the country buzzing.

Prof Kirsten's interest was sparked by how products with a regional identity had expanded dramatically over the past two decades since the recognition of geographical indications (GIs) as a distinct form of intellectual property under the WTO's Trade-related Aspects of Intellectual Property Rights Agreement (TRIPS).

Famous GIs include products such as Champagne, Parma ham and Roquefort cheese.

Cerkia Bramley, a qualified attorney and an agricultural economist, completed her master's degree under Prof Kirsten's supervision and subsequently assisted him in a multi-national project on GIs in southern Africa, focusing on Southern African GIs, such as rooibos and heuningbos tea, Karoo lamb, Kalahari melon-seed oil and karakul fur (Namibia).

Having grown up in the Cape, the Karoo lamb and the intellectual property attached to the name and culture of this specific region are very close to Prof Kirsten's heart. He explains that in the case of Karoo lamb, the specific region and the vegetation on which the animals feed, determine the distinctive taste of their meat. The Karoo is a unique region and includes parts of the southern Free State and the Eastern, Northern and Western Cape. 'It's about the climate, the place, the process and the people,' Prof Kirsten emphasises.

A book entitled *Developing geographical indications in the South*, which emanated from this research, was edited by Cerkia Bramley, Estelle Biénabe and Prof Kirsten.



Prof Johann Kirsten

After realising the potential of the Karoo lamb and the need to protect its name to benefit the region and its people, Prof Kirsten started to cooperate with different role players and different government departments. Since the farmers showed considerable interest in the Karoo lamb product idea as a valuable asset, sensory aspects of the Karoo lamb were scrutinised – in particular the very specific taste that comes from the Karoo bushes on which they feed. Prof Hettie Schönfeldt, a meat-science expert, got involved to assist with the important aspects of meat science.

The Northern Cape government also came to the party and provided the funding needed to develop a certification mark. Prof Kirsten founded the Karoo Development Foundation (KDF) as a community outreach project, but also to protect and legalise the use of the name 'Karoo Lamb'. The KDF is now the owner of the certification mark, which plays an important role in protecting the broader interests of the Karoo and also helps role players in the process of commercialising the Karoo Meat of Origin certification scheme.

At the University of Pretoria this project expanded and evolved into cross-disciplinary research. Four master's dissertations dealing with different aspects of the GI of Karoo lamb have already been completed and two students in the Department of Agricultural Economics, Extension and Rural Development are working on their PhDs. Four master's students in consumer science also completed their research on related aspects, and in animal and wildlife sciences research is currently being conducted on the amino acids and the vegetation on which Karoo lambs feed. Other research that developed from the Karoo lamb initiative investigates the sensory/aroma aspects (food science), and researchers in the Department of Chemistry are trying to determine the differences between lamb from the Karoo and lamb from other regions, for example the Kalahari, where the animals feed mainly on grass. To this end they are using sophisticated equipment and techniques such as comprehensive gas chromatography and time-of-flight mass spectrometry.

New priorities for Antarctic Science



Prof Don Cowan, Director of the Centre for Microbial Ecology and Genomics and of the Genomics Research Institute, is one of the co-authors of a recent *Nature* commentary in August this year on the future of Antarctic Science.

Antarctic research produces new knowledge that is globally important and potentially game-changing for high-level decision-makers. Therefore, Antarctic research needs sustained and stable funding for long-term studies; access to the entire region throughout the year; new technologies to acquire and manage large and diverse datasets; stronger protection of the region's fragile environment; international cooperation and partnerships; and better communication amongst scientists, policy-makers and the public.

These are some of the key findings of a global Antarctic Foresight Scanning workshop which brought together 75 of the world's leading polar scientists and policy makers during April 2014. They identified the most crucial risks and Antarctic research questions that must urgently be addressed and drew up a roadmap for future Antarctic research. They specifically call for intensified research into Antarctica's climate, oceans, biodiversity and geological history.

"Antarctica is not just a distant continent that we can afford to ignore," Prof Cowan explains. "This continent and its surrounding seas control much of the world's climate and for that reason it is vital for us to understand how global climate change is affecting Antarctica, and how changes in Antarctica impact the rest of planet Earth and all of us."

"We used to think of Antarctica as a continent frozen in time, but we now know that it is changing dramatically all the time. Its glaciers are melting and ice sheets are shifting," Cowan adds. "In a warming world, these processes may accelerate dramatically, releasing large quantities of freshwater into the southern oceans. Apart from increases in sea-level, which might have devastating effects on coastal communities over the next century, a more immediate concern is the effects of Antarctic ice-melt on the ocean 'conveyers' – the surface and deep currents that carry nutrients and heat around the world – and which play major roles in global climates."

Antarctica is also one of our planet's last great wilderness areas and it is under increasing threat, hence the call for stronger environmental protection measures. In addition to a growing number of scientists visiting the continent, tourist numbers have tripled over the past decade to around 34 000 a year. Other threats come from increased fishing and exploration for oil, gas and minerals. Scientists are therefore in a race against time to document the continent's biodiversity and understand its unique ecosystems, as well as the impact of our growing reliance on it.

This foresight exercise identifies the need for Antarctic researchers to scale up their science communication skills and efforts. It points out that Antarctic researchers need to work harder so that the rest of the world considers their work more meaningful and relevant. They must learn how to tell compelling stories that will help people to understand how this unique continent affects our daily lives and how we all play a role in creating pressures on the Antarctic; but also how we can be part of the solution to preserve it for the future.

The roadmap points out the major challenges facing Antarctic scientists. Fluctuations in funding, budget uncertainties and interruptions to field work have caused delays and postponements of field work. This resulted in irreplaceable gaps in long-term scientific studies, with scientists agreeing that a key future goal of Antarctic research should be to “maximise scientific return while minimizing the human footprint”. There is also concern about the next generation of Antarctic researchers, since the uncertainties and long periods of isolation that are part of working in the Antarctic have caused many scientists to leave the field in recent years, making it difficult to recruit young researchers.

The authors of this *Nature* commentary call for a renewed commitment to the spirit of cooperation espoused by the founding nations of the Antarctic Treaty more than 50 years ago (South Africa was a founding member). This would include wider international partnerships, better coordination to fund science and infrastructure and enhanced knowledge-sharing. They conclude that “the southern polar community must act together if it is to address some of the most pressing issues facing society.”

Antarctic Facts

Antarctica represents 10% of the world's surface, over 90% of the globe's ice and 70% of its fresh water.

The Antarctic ice sheet contains approximately 26.5 million km³ of ice that have been stable for thousands of years but it is now melting faster than ever before. If completely melted, this would cause global sea level rising of tens of metres (<http://nsidc.org/cryosphere/quickfacts/icesheets.html>).

The continent has nearly 18 000 km of coastline and the only ocean that encircles our planet.

Prof Don Cowan with a portable lab in Antarctica



The more termites, the merrier the aardwolves



Adult aardwolf (Photo: Low de Vries)

What do aardwolves and whales have in common? Both are extremely picky eaters, to the point of only feeding on one foodstuff over and over again. As is the case with some whales and the plankton they eat, aardwolves will rather eat less than diversifying their menus to include anything but their favourite termites.

This is one of the findings made by aardwolf researcher, Dr Low de Vries of the University of Pretoria's Mammal Research Institute, after studying this smallest member of the *Hyaenidae* family for six years. In the process he completed the most comprehensive study to date about what aardwolves eat and how they share their home and feeding ranges with others of the same species.

De Vries graduated with a doctorate in Zoology from the University of Pretoria (UP) in September. He could not attend the ceremony though, as he was fulfilling a long-held dream to spend a year as a member of South Africa's annual research team on Marion Island. He is collecting data on this sub-Antarctic island about the ecology and population dynamics of elephant seals, two species of fur seal and killer whales.

For his PhD research, though, De Vries spent many a cold night and warm day on the Benfontein Nature Reserve near Kimberley in the Northern Cape, either catching termites and ants in pitfalls, or collecting aardwolf scat to study and investigate in the laboratory at UP. In the process he also developed a new method to examine scat thoroughly.

Termites are not very nutritious, and during the colder months they are relatively inactive. Dr De Vries notes: 'Therefore, in theory, aardwolves are too large an animal to be able to sustain themselves on termites alone, but I have found that the abundance of termites dictates many aspects of their ecology. Few other mammals are as highly specialised and selective in their diet as the aardwolf.'

De Vries is the first researcher to show that aardwolves do nibble on the odd scorpion at times. He also confirms that these shy animals will try out a large type of spider called a *solifugid* or camel spider. However, he found that aardwolves still rely almost completely on termites (*Trinervitermes trinervoides*) for sustenance. They do not readily switch to other prey, even in times when termite numbers are low.



Dr Low de Vries (Photo: Fred Dalerum)



Young aardwolf on a termite mound. (Photo: Philip Richardson)

'Aardwolves are capable of feeding on a much larger variety of prey than previously thought, if they wanted to,' he explains. 'However, instead of incorporating more types of prey into their diets during the dry months when termite numbers are low, they lower their metabolic rate and can lose up to 20% of their body mass.'

Aardwolves are only found in areas where termites also occur. 'The general size of an aardwolf's home range is actually larger than would be expected for an animal of its size, possibly to ensure that there's enough of its food source available or to ensure adequate mating opportunities,' he muses.

De Vries says that the more termite mounds there are in an area – irrespective of their size – the smaller the animal's home range tends to be.

'Aardwolf home ranges will vary across South Africa, depending on the abundance of termites,' he says. De Vries also found that aardwolves are quite neighbourly and allow home ranges to overlap. Males also tend to share dens. This is contrary to previous research done in the 1980s that showed that aardwolves could be quite aggressive towards neighbours from adjacent home ranges.

Through his research De Vries also made interesting findings about the insects, spiders and scorpions that live in arid regions. He noted how temperature, rather than rainfall, has a bigger influence on their abundance and the diversity of species – quite the reverse from what is found in habitats such as forests. The finding is of importance, considering that animals such as the aardwolf, armadillo, bat-eared fox and yellow mongoose rely almost solely on arthropods as their main meals, and in view of the fact that arid parts of South Africa are thought to experience higher temperatures and drier conditions as a result of global warming.

'Aardwolves and other insectivorous animals might face a decrease in food availability due to climate change, which might influence their distribution and survival,' predicts De Vries.

Dolphins whistle to their own tune

Humans greet each other by name. Bottlenose dolphins do much the same – they just each whistle their own tune. A recent study reveals Africa's wild Bottlenose dolphins use unique whistles to address each other.

Research on dolphin acoustic communication in the wild is less common and until now it was unclear whether or not African Bottlenose dolphins use a similar communication system to those studied in other localities.

Dr Tess Gridley (UP postdoctoral fellow) and Dr Simon Elwen (UP research fellow) from the University's Mammal Research Institute (MRI) conducted research on whales and dolphins in Namibia and run the Namibian Dolphin Project. Since 2009 they have been investigating the fascinating lives of a small population of Bottlenose dolphins inhabiting Walvis Bay, located on the central Namibian coast.

"The research that was published recently outlines some of the first results of this study. It demonstrates that individual dolphins are likely to use unique signature whistles throughout their lives, probably to keep in contact and address each other.

"This is the first time that signature whistles have been identified from any population of this species inhabiting African waters, and it is only the second wild population of this species where the features of the signature whistles have been described in detail," says Dr Gridley.

The research results forms part of master's thesis of their student, Ms Hannah Kriesell, who graduated earlier this year from the University of Goettingen in Germany.

More than 79 hours of recordings, collected over four years in the presence of dolphins, were used to generate a catalogue of 28 signature whistles – around one quarter of the population in Namibia. Evidence for two-voice whistle production (imagine if you could whistle two different tunes at the same time) was also found. According to Dr Gridley, two-voice sound generation occurs in some bird species and may be a way to make calls more complex – which can be a good thing if you want a really unique signature call.

The study also shows that the number of different signature whistles recorded increased when group sizes were larger and when calves were present – something you might expect if signature whistles are used to address each other and help maintain contact between animals, particularly between mothers and calves.

The outcomes of this research provide an important stepping stone for future studies into how sounds are used and whether human activities are affecting the communication of our whale and dolphin populations. This is particularly important in Walvis Bay where the impacts of human activity threaten the small Bottlenose dolphin community. Researchers from the MRI Namibian Dolphin Project hope to monitor changes in dolphin behaviour related to such potential stressors.

Photo credit: Dr Simon Elwen



Research on ticks of great value



Dr Christine Maritz-Olivier

One hostile little creature is causing devastation to cattle in all the major livestock-production provinces of South Africa. Dr Christine Maritz-Olivier of the Department of Genetics in the Faculty of Natural and Agricultural Sciences is leading a group of postgraduate students who are achieving success with finding a solution to alleviate, and hopefully, eradicate the current problem of cattle ticks. Their work includes an advisory service offered to farmers regarding the selection of dipping agents to which resistance has not yet been established on their farms, as well as on vaccine development against the parasite. This combination has proved to be a powerful force in combating this parasite. This service not only benefits the farmer, but also enriches the group's research data.

The cattle tick, *Rhipicephalus microplus* was fairly absent across the largest part of Africa in the past, but was introduced into South Africa with the importation of cattle. This parasitic pest is not only infesting previously unaffected areas, but is also displacing less aggressive endemic tick species throughout much of eastern and southern Africa. In addition, it transmits lethal diseases like red water and gall sickness, with direct

implications for farmers' livelihoods and an indirect influence on the South African economy. Effective control of this tick, as well as its transmitted diseases, is quite difficult owing to its rapid development of resistance to chemical dipping agents. Dr Maritz-Olivier notes that farmers often do not buy the most effective dipping chemicals, but rather opt for cheaper, less effective variants.

Dr Maritz-Olivier's team does DNA analyses on sample ticks, sent to the genetic laboratory at UP to scientifically determine the DNA sequences of resistant genes, which enables them to establish which dipping agents should not be used. By including additional DNA tests they are able to study the genetic diversity of this tick species, which also contributes to their vaccine development strategy in that they can shape their vaccine to be effective against the most prominent species that occur in Southern Africa. The vaccines already developed by the UP team have shown positive results, reducing the number of ticks on cattle by at least two thirds. The vaccines are currently being improved to also inhibit the bio-ability of tick eggs, implying that once hatched, offspring are not strong enough to re-infect cattle.

Countries across the world that depend largely on cattle, like most countries in Africa, are in great need of a solution to fight *R. microplus*, and this UP research team is leading the way. Their research is the first to develop new genetic markers that look specifically at the genetic diversity of the species. This is valuable to international research, as the number of strains of this species remains unknown. The team, in collaboration with the global animal health company Zoetis, has patented an acaricide diagnostic test and is rolling it out to consumers.

It is encouraging to see departments across UP faculties working together in research in pursuit of better, cross-boundary results. Dr Maritz-Olivier's group has also joined forces with two departments of the Faculty of Veterinary Sciences to ensure that they reach their five-year goal to develop an entire pipeline, established for veterinarian vaccine production in order to fight such devastating tick species and their associated tick-borne diseases. Through interdisciplinary research, a thorough understanding of the vector, its transmitted diseases and types of treatment is becoming a reality.

A new generation of research-driven leaders in agriculture

South Africa is a fertile land and so the question arises as to how it is possible to date that we have been unable to effectively feed our people? According to Mr Shaun Berry of BASF-Becker Underwood, a company involved in a joint research grant partnership with the University of Pretoria (UP) and the Department of Agriculture, Forestry and Fisheries (DAFF), not enough research is currently being done to develop new technology for South African farmers.

To help mitigate this situation, the company awarded an amount of \$200 000 over four year period, (starting in 2013), to support research grant projects involving students in agricultural sciences at UP. The grants awarded are helping to develop a network of qualified staff for agricultural product registrations.

At the launch of the programme in 2013, Daniel Krohn, global sustainability leader for Becker Underwood, said, 'We spent almost a year looking at investment opportunities in the educational systems located in the communities in which we operate and identified an opportunity to partner with UP in order to address a skills shortage in the South African agricultural market. We are convinced that our investment will produce a younger generation of educated, research-driven leaders in agriculture, which is essential to the country's competitiveness globally.'

The programme was initiated by Becker Underwood, which has since been acquired by BASF, a chemical company whose portfolio ranges from chemicals, plastics, performance products and crop protection products to oil and gas. The joint research grant programme has, however, by no means been affected and still forms part of the company's Sustainable Ventures Initiative – a programme aimed at investing resources in sustainable development opportunities.

At a recent event organised by the Institute for Food, Nutrition and Wellbeing, some of the students who are benefitting from the grant programme had the opportunity to bring representatives from Becker Underwood, BASF and the Department of Agriculture, Forestry and Fisheries up to date on the progress made with their research projects.

The projects that are being pursued include the following:

Ms Makgolane, an MSc Plant Pathology student at UP, is investigating the combined use of plant growth promoting rhizo bacteria and fungicides using wheat and fusarium root rot as a model system.

Ms Motileng, who is currently busy with an MSc in Entomology, is evaluating the possible use of botanical essential oils for the management of the maize weevil and the larger grain borer.

Mr Mutengwe, a PhD student in Crop Protection, is doing a risk analysis of maximum residue limits for fresh fruits and leafy vegetables in the local fresh-produce and retail markets in South Africa.

Ms Mahlangu is pursuing her MSc in Veterinary Sciences by screening South African plants for activities against salmonellosis.



Prof Lise Korsten

The students are all conducting valuable research in the fields of agriculture and nutrition – and some of them are doing this despite great financial difficulty. To document the progress of the programme, the company also produced a video, 'Getting there, Social Ventures Program', containing interviews conducted in their hometowns with some of the participating students and their families.

Peter Innes, who was the CEO of Becker Underwood when the project was launched, remarked at the time: 'We have a wonderful opportunity to develop talent that will have a positive impact in South Africa through participation in our joint programme. We have an opportunity to show the world that partnerships like ours with the University of Pretoria and Department of Agriculture Forestry and Fisheries (DAFF) are possible and can deliver positive results, to the benefit of a broad constituency.'

If the quality of the research undertaken by the UP students who are part of this programme is any indication of the quality of the professionals we can expect to have in the South African agricultural sector in the future, we can look forward to seeing some real progress in this area.

According to Prof Lise Korsten, programme organiser for the UP Institute for Food, Nutrition and Well-being, the University plans to expand on these partnerships in order to ensure that government has adequate competent staff to support a viable and strong agricultural sector. A new capacity-building programme for sanitary and phyto sanitary services is also being developed and a laboratory accreditation programme for academics has recently been launched at UP.



Freddy Milambo Tshiala



Image credit: Ajith_chatie at Flickr under a Creative Commons license

Limpopo's tomato growers have to face up to climate change

uniform pattern of changes in temperature was evident across the different catchments. The seasonal trends showed variability in mean temperature increases, of about 0.18°C per decade in winter and 0.09°C per decade in summer. The significance of this work lies in the linkage of temperature to the hydrological cycle.

The long term fluctuation in temperature was represented by computing the linear trends in the data records. Although the variability of temperature trends exhibits a spatial dependence, the trends are undoubtedly real and the warming is large enough to have significant impacts on the hydrology and ecosystems of the region.

In this study it was demonstrated that frequent exposure to drought causes agricultural production to be out of equilibrium with seasonal conditions. It is therefore recommended, especially for most smallholder farmers, that they adjust land use to climate variability. In order to maintain or increase tomato yields, given the continuing trends of climate change, assessment studies must be conducted in order to identify present yield thresholds, and in future, to help select appropriate adaptation strategies to support tomato cropping systems.

In this research temperature was the climatic factor which was used it to study the impact of climate variability on tomato production in Limpopo. The recommendation to future researchers would be to extend the study by using some other factors as well, for example rainfall, humidity or water vapour.

According to the Intergovernmental Panel on Climate Change (IPCC) Africa will be hit hardest by climate change as larger areas could be struck by yield decreases of over 50% by the year 2020 because of an increasingly hotter and drier climate. This will threaten food security and the livelihoods of people in most parts of Africa.

Climate change and future food ... A recent PhD graduate from the Faculty of Natural and Agricultural Sciences focused on how climate change will affect tomato farmers in Limpopo.

Limpopo Province produces 66% of the total annual tonnage of tomatoes grown in South Africa. The province is also deemed particularly vulnerable to the impact of climate change, partly because it is exposed to extreme weather events. A new study demonstrates the extent to which current climate change scenarios are likely to impact tomato production and proposes possible methods for farmers to mitigate the impact.

For his doctoral theses, Freddy Milambo Tshiala of the Department of Geography, Geoinformatics and Meteorology at the University of Pretoria set out to determine how climate change might influence the distribution of a tomato pest – a species of leaf miner fly – in the Limpopo Province. Tshiala made use of different population parameters and variability of temperatures over different climatic periods in processing his data. He did a detailed analysis of annual seasonal trends in minimum and maximum temperatures, as well as the daily temperature range over Limpopo Province for the period 1950-1999.

Daily data from 30 catchments were used to analyse the trends. Over the 50 year period there was an overall increase of 0.12°C per decade in the mean annual temperature for the 30 catchments. A non-

Research conducted on influence of temperature on the vectors of African horse sickness

African horse sickness (AHS) is endemic to the African continent and has, for many years, led to a ban on exports of live horses to uninfected countries. The disease affects all breeds of horses, mules and donkeys and has a very high mortality rate.

The virus that causes the disease is transmitted to horses by tiny blood-feeding midges of the genus *Culicoides*. The type of midge most common in Gauteng is *Culicoides imicola*, while *Culicoides bolitinos* is more abundant in areas with cooler climates, such as parts of the Free State and KwaZulu-Natal. Research done in the Department of Zoology and Entomology at the University of Pretoria (UP), in collaboration with the Agricultural Research Council (ARC) and Onderstepoort Veterinary Institute found that the abundant occurrence of these two species of midges in the respective areas is at least partly due to their different abilities to withstand cold temperatures.

In 1997, an AHS controlled area that included a small free zone was established in the Western Cape to enable horse exports to the European Union (EU). However, this trade was disrupted several times, owing to outbreaks of AHS in the controlled area (although never in the free zone). As AHS is seasonally endemic in South Africa – meaning that it occurs mostly in the warm, rainy season when midges are plentiful, and disappears after the first frost, when the midges die – it stands to reason that temperature could be a factor in the life cycle of the organisms that transmit the virus from one infected animal to another. Arné Verhoef, a postgraduate student at UP, conducted research on the influence of temperature on the vectors of the AHS virus, in this case the two species of midges *C. imicola* and *C. bolitinos*. The study was conducted under the guidance of Dr Gert Venter, an Extraordinary Professor in the Department of Veterinary Tropical Diseases, and Dr Chris Weldon, a lecturer in the Department of Zoology and Entomology at UP. The findings of the study were published in the open-access journal, *Parasites and Vectors*.



African horse sickness is transmitted by very small blood feeding midges in the genus *Culicoides* (Photo: Dr Chris Weldon)

In the journal article, the researchers reported that under cold conditions adult *C. imicola* lost their ability to move and experienced high levels of mortality. In *C. bolitinos* the same results were obtained, but the temperatures required to achieve these results were much lower than in the case of *C. imicola*. It was found that, remarkably, some adult *C. bolitinos* were able to survive at temperatures as low as -6°C , whereas the same temperature led to complete mortality in *C. imicola*. The tolerance of the two species under hot conditions was found to be quite similar.

Further research is required on the environmental variables that influence the abundance of AHS virus vectors, but the results obtained suggest that the distribution and abundance of *C. imicola* is likely constrained by their relatively poor tolerance of lower temperatures. Results for *C. bolitinos* suggest that they are more resistant to extreme changes in temperature, which gave rise to the hypothesis that the thermal biology of other stages in their life cycle could determine their range. The improved knowledge of the influence of temperature on the life cycle of these midges could assist in the creation of more realistic risk maps for AHS in South Africa and could help to shed light on the effect of climate change on the presence and expansion of this and other viral diseases.

Read the full article, as published in the journal *Parasites and Vectors*.

Junior Lecturer awarded for her PhD

Dr Madelein Basson, a junior lecturer in the Department of Mathematics and Applied Mathematics was awarded her PhD in Mathematical Sciences during the September graduation ceremonies and was duly awarded for completing it in less than three years. Dr Basson received an economy air ticket to attend a conference of their choice.

Dr Basson enrolled in 2005 at the University of Pretoria, where she was awarded a BSc in Applied Mathematics cum laude, a BSc(Hons) in Applied Mathematics and an MSc in Applied Mathematics cum laude. She enrolled for a PhD in Mathematical Sciences in 2012 and completed it early in 2014.

She also won first place in a competition for

the best presentation by a master's student at the Joint Congress of the South African and American Mathematical Societies in 2011.

In her thesis, *Error analysis for Galerkin finite element approximations of general second order hyperbolic equations*, she established a general convergence theory for a class of problems referred to as second order hyperbolic equations. This includes the complex systems of partial differential equations that arise from the vibration of structures consisting of elastic bodies.

Two articles have been published on the research, and parts of the thesis have been presented at national and international conferences.



Dr Madelein Basson and her supervisor, Prof Van Rensburg (left)

UPs wonder couple take on cancer



Professors Annie and Fourie Joubert

Chemotherapy and radiation that are used currently in the fight against cancer not only attack cancer cells, but also normal cells, and this leads to side effects for patients receiving treatment. In 2005, UP wonder couple, Professors Annie and Fourie Joubert decided to combine their expertise in biochemistry and bioinformatics in pursuit of developing a new anticancer drug that targets only cancer cells. Together with their postgraduate students, and with national and international collaboration, they have so far achieved results that hold great promise for anticancer drug development.

Breast and cervical cancer are highly prevalent in South Africa. Fourie and Annie's research mainly focuses on agents that target the proliferation of these cancer cells, but leave normal cells unharmed. Components actively involved during cell division have to be studied with a view to preventing cancer cells from multiplying. A particular part of the cell, known as the microtubule, plays an important role during mitosis. It is therefore important to disrupt cancer cell microtubule dynamics in order to suppress or stop cell growth. However, a drug that not only disrupts microtubule dynamics, but also interferes with the formation of new blood vessels (angiogenesis), will be an additional advantage to the field of cancer therapy. Without angiogenesis, nutrients' access of cells is impaired, very much like if the roots of a plant are cut off, it causes cell death.

As Director of the Bioinformatics and Computational Biology Centre, Prof Fourie Joubert used his expertise in computational methods to

better determine how cells would react to various chemical compounds, with a view to developing new anticancer drugs. Working under the supervision of Prof Joubert, André Stander, a PhD student, *in silico* designed antimitotic agents using bioinformatics software. From this study, new compounds, showing potential anticancer characteristics, were designed. Chemical drug synthesis was conducted by iThemba Pharmaceuticals (Pty) Ltd.

Together with her research collaborators and postgraduate students, Prof Annie Joubert of the Department of Physiology (Faculty of Health Sciences) took this study further. They are currently conducting *in vitro* cellular and molecular studies to assess the potential anticancer efficacy of these newly designed compounds on breast and cervical cancer cells. One of her PhD students, Joji Theron, was recently in Grenoble in France, testing the anticancer efficacy of some of these compounds. The research project has successfully advanced to the assessment of the drugs' effect on human blood cells. In order to further investigate clinical anticancer drug efficacy, *in vivo*, studies using mouse models are expected to be done in collaboration with researchers at Onderstepoort in 2015. Different cancer markers will be measured and possible reduction in tumour size will be assessed to determine the efficacy levels of these drugs.

Cancer is a non-discriminatory disease; however, with such commitment as Professors Annie and Fourie Joubert have shown, we can only be encouraged and hopeful for the future of anticancer drug research.

UP to collaborate on project to address hunger and malnutrition

Professors John Taylor, Riette de Kock and Gyebi Duodu, Institutional Research Theme on Food, Nutrition and Well-being associates from the Department of Food Science, were awarded a competitive grant in a series of projects representing the best ideas and strategies from around the world to address the problem of hunger and malnutrition in some of the world's most ruthless agricultural regions.

The collaborative international projects, which will be funded by the Feed the Future Innovation Lab for Collaborative Research on Sorghum and Millet, will contribute towards improving food security, household resilience and private-sector growth in Ethiopia, Senegal and Niger through the enhancement of production and value-added product development.

Following a rigorous competitive selection process that included recommendations from the Laboratory's external advisory board and dozens of ad-hoc reviewers, only ten projects were selected from the 58 proposals received. UP was the only South African University selected to collaborate.

'These projects represent the best ideas and strategies, drawn from around the world, to tackle the problem of hunger and malnutrition in some of the world's most difficult agricultural regions,' said Timothy Dalton, Director of the Lab and associate professor of Agricultural Economics at Kansas State University. 'The process will require patience, hard work and dedication, and we've assembled a fantastic team to attack these problems.'

UP will be a partner together with Texas A&M University in the USA and Ethiopia's Hawassa University in a project concerning 'Developing superior functionality in sorghum for food applications to promote the sorghum value chain in Ethiopia'. The principal investigator will be Professor Joseph Awika from Texas A&M University, who has previously collaborated with the sorghum researchers in UP's Food Science Department. An amount of \$809 941 has been allocated to this project.

The Feed the Future Innovation Lab for Collaborative Research in Sorghum and Millet is a consortium of cutting-

edge researchers aiming to improve the adaptation and resilience of sorghum and pearl millet to the semi-arid climates of East and West Africa, with a focus on Ethiopia, Senegal and Niger.

The Lab, which was established in July 2013 at Kansas State University, contributes technologies and knowledge towards the adaptation, resilience and improved profitability of sorghum- and millet-based production systems and value chains. This is supported by a grant received from the United States Agency for International Development (USAID) as part of Feed the Future, the US government's global hunger and food security initiative (www.feedthefuture.gov).

The Lab links US and international universities and research organisations in a collaborative effort to build human and institutional capacity in Ethiopia, Niger and Senegal and to make sorghum and pearl millet the crops of the future. Additional information regarding the Sorghum and Millet Innovation Lab can be found at <http://www.k-state.edu/smil>.



Prof John Taylor



Prof Riette de Kock



Prof Gyebi Duodu

IFNuW leads a national accreditation initiative and opens career paths for students

The Institute for Food, Nutrition and Well-being (IFNuW) is the driving force behind an important initiative aimed at ensuring the adequacy of food, not only in quantity but also in quality that is available to the South African public.

The current lack of evidence regarding food safety standards in South Africa induced Prof Lise Korsten from the IFNuW to address the need for thorough and accurate measurement and evaluation of food safety standards at all levels in the food supply chain. UP researchers across the broad domain of food security were assembled to form a panel with IFNuW experts to share knowledge and discuss country-wide improvements.

The IFNuW acknowledges the importance of having accredited facilities and systems in the food industry to provide adequate food safety standards, and for this reason it has partnered with the South African National Accreditation System (SANAS). As a research and training facility, it is imperative for the IFNuW to introduce people to the accreditation landscape and to highlight the importance of laboratory accreditation and good laboratory practices. Through this partnership, an initiative to develop capacity in food safety and laboratory accreditation was established, and SANAS now offers bursaries and mentorship programmes to UP students. These programmes include training related to quality infrastructure and international accreditation bodies, and exposure to careers in laboratory accreditation, such as assessors and technical experts. Two UP honours students, Ntombifuthi Tina Nkosi (in the field of Medical Physics) and Sphumelele Felicity Mkhize (in the field of Plant Pathology) received SANAS bursaries for 2014.

The Institute hopes that an accreditation framework will be implemented at all academic institutions and that their non-accredited laboratories will come on board. If institutions are familiar with the accreditation framework, they will be able to implement good laboratory practice, such as ensuring the suitability of environmental conditions and the suitability, calibration and maintenance of equipment, even if their laboratories are not accredited. This will contribute to producing

well-qualified and efficient individuals who will be able to exercise control. With 11 laboratories across different faculties that have been accredited by SANAS, UP is leading the way among tertiary institutions and setting a good example.

This initiative will not only benefit the people of South Africa, but it can provide a model for other countries on the continent in terms of investing in the capacity of young people, particularly with regard to career choices (ranging from production to policy-making) related to the unique area of food security.



Prof Sheryl Hendriks (Director of the IFNuW)

The driving force behind this initiative and partnership, Prof Lise Korsten, is a three-time recipient of UP's Exceptional Achiever Award, and she received special recognition from SANAS twice for her significant contribution to improving and promoting SANAS accreditation.

Prof Korsten previously served on the board of the National Laboratory Association, the Post-harvest Innovation Programme of the Department of Science and Technology and of the Fresh Produce Exporters' Forum. She is a member of the Specialist Technical Committee of SANAS. Prof Korsten is a professor in the Department of Microbiology and Plant Pathology in the Faculty of Natural and Agricultural Sciences, and leads the programme, "Ensuring safer food through effective control and regulation" at the IFNuW. She was also elected to serve on the International Society for Plant Pathology (ISPP) and chairs the Global Food Security Task Force.

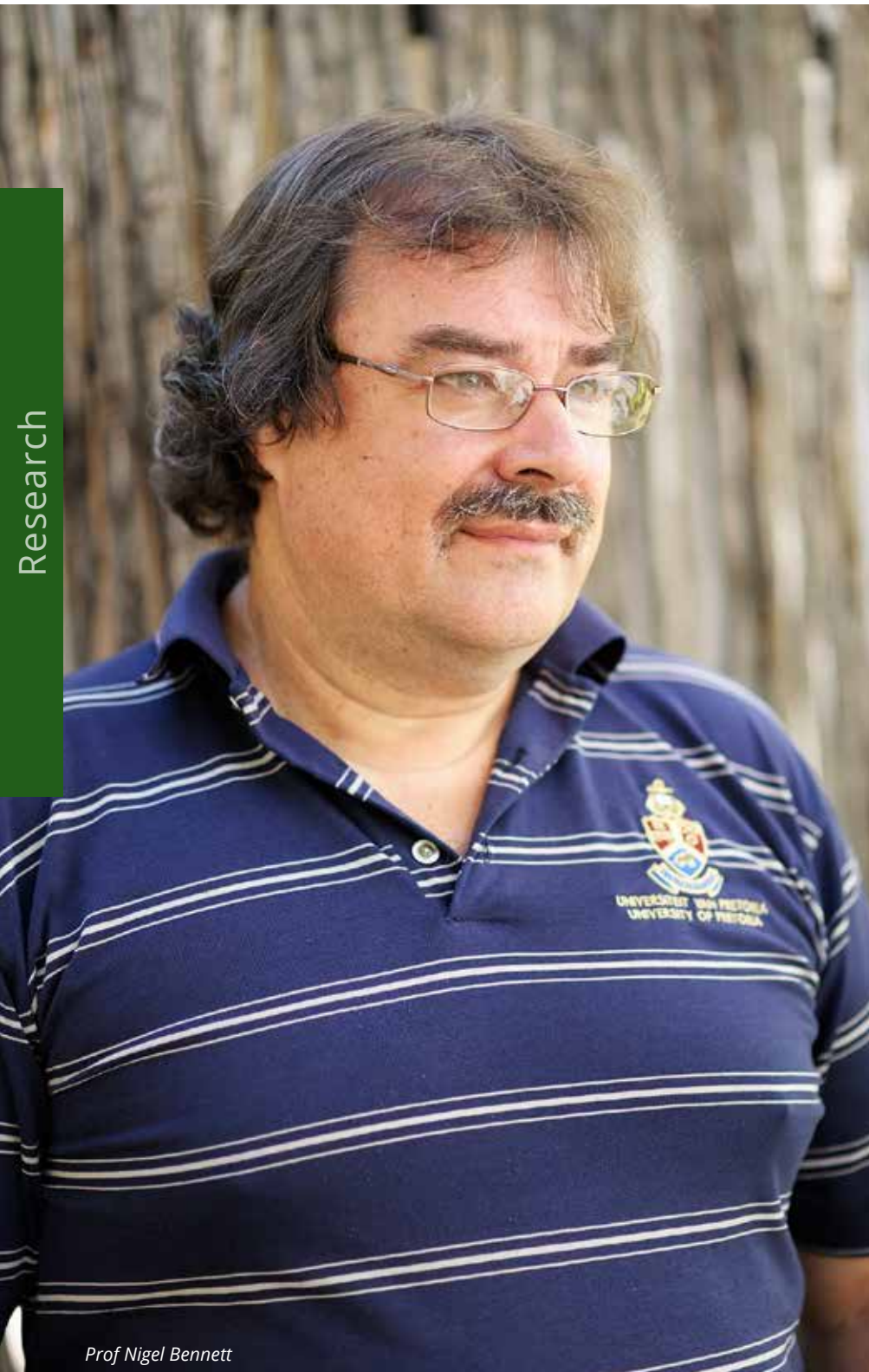
SANAS is recognised by the South African government as the only national body for the accreditation of laboratories, certification bodies, inspection bodies, proficiency testing scheme providers and good laboratory practice test facilities, and it is mandated to ensure that all related tasks are carried out competently and in terms of the Accreditation for Conformity Assessment, Calibration and Good Laboratory Practice Act, 2006 (Act 19 of 2006).[1]

[1] <http://home.sanas.co.za/>



Prof Lise Korsten (IFNuW)

New study suggests humans are to blame for plummeting cheetah numbers



Research

Prof Nigel Bennett

A new study led by Queen's University, Belfast Northern Ireland, into how cheetahs burn energy suggests that human activity, rather than larger predators, may force them to expend more energy and consequently be the major cause of their decline.

UP mammal expert and research chair Prof Nigel Bennet is the co-author of a recent paper on the energetics of cheetah hunting techniques. The lead author, Dr Mike Scantlebury from Queen's University, was a postdoctoral fellow at UP before relocating to Belfast.

The wild cheetah numbers are down to below 10 000 from an initial figure of 100 000 a century ago with conventional wisdom blaming bigger predators for monopolising available food resources as their habitat becomes restricted. The traditional thinking has been that cheetahs no longer have sufficient access to prey to fuel their enormous energy output requirements when engaging in super-fast chases of their prey.

But, in the first study of its kind, published today in the international journal *Science*, academics from Queen's, other universities and conservation institutions have made the surprising discovery that, in the main, cheetahs do not use significantly more energy than other, similar-sized mammals.

The scientists also discovered that, in searching for prey, cheetahs incur more energy loss than in outbursts of running which, although spectacular, are infrequent. So, where their prey have been reduced or re-distributed through human impacts, their ability to balance energy budgets have been severely curtailed.

Lead researcher Dr Michael Scantlebury from Queen's School of Biological Sciences said: "We studied 19 free-roaming cheetahs individually for two weeks across two sites in Southern Africa, one site located in the Kalahari Desert

and the other site located in a wetter area. We injected heavy water into the animals before tracking them continuously and collecting their faeces. From these samples, we could determine how much of this heavy water they were losing each day and calculate their energy expenditures."

"What we found was that the cats' energy expenditure was not significantly different from other mammals of similar size – cheetahs may be Ferraris but most of the time they are driving slowly. What our study indicated was that their major energy costs seem to be incurred by travelling, rather than securing prey. If you can imagine walking up and down sand dunes in high temperatures day in, day out, with no water to drink you start to get a feel for how challenging these cats' daily lives are, and yet they remain remarkably adapted and resilient."

"They can even withstand other species, such as lions and hyenas, stealing their prey. The reality may be that human activities – for example erecting fences that inhibit free travel or the over-hunting cheetah prey – are forcing cheetahs to travel ever-increasing distances and that this may be compromising their energy budget more than any other single factor. Our study, which is the result of ten years' of research, seriously questions previously held assumptions about the factors affecting population viability in large predators threatened by extinction."

Co-researcher Dr Nikki Marks, also from Queen's University said: "Research of this type helps improve our understanding of the challenges facing cheetahs as they strive to survive and helps to inform future decisions on conservation strategies for cheetahs and other threatened animals."

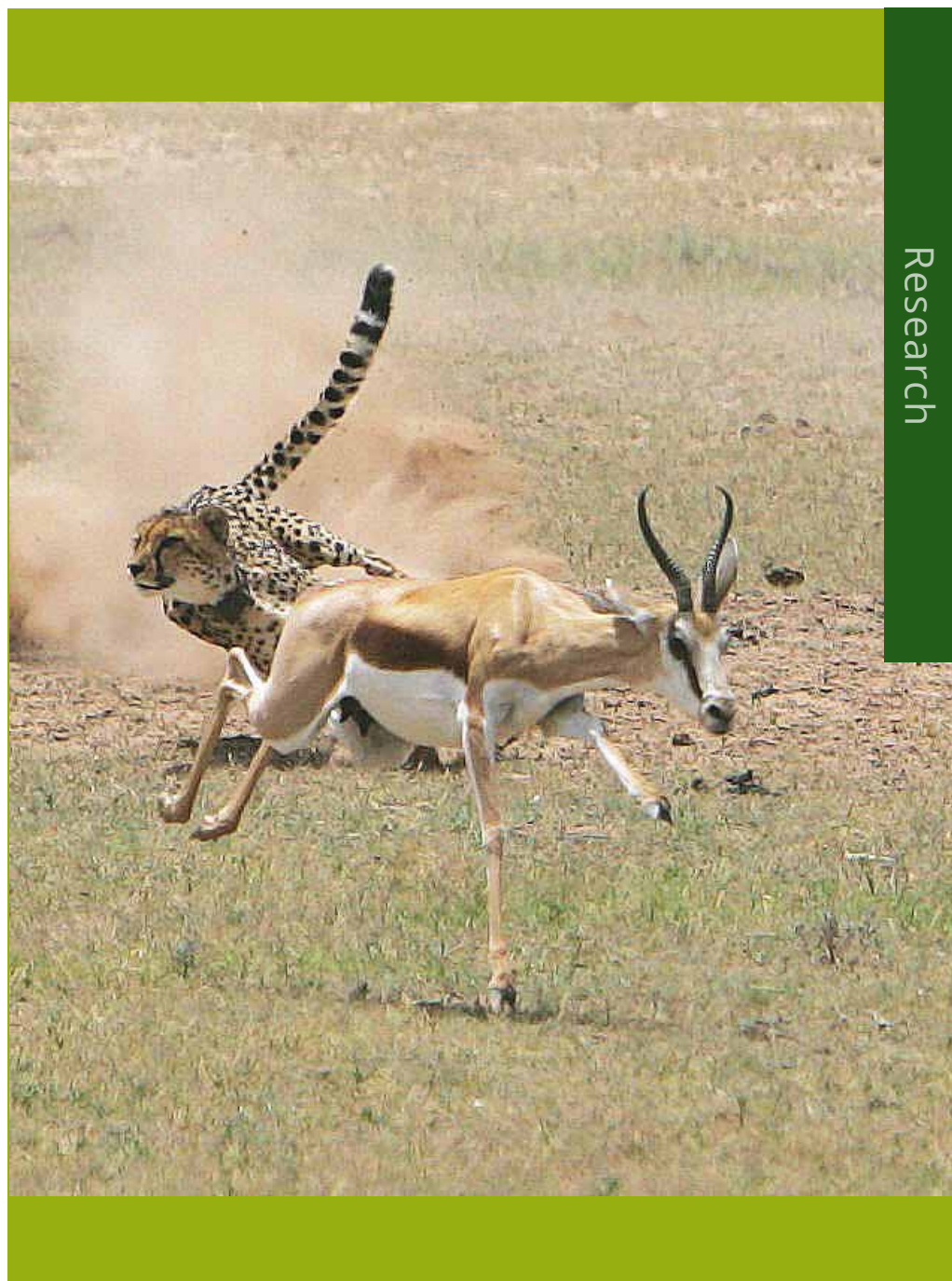
Manuscript co-author Dr John Wilson of North Carolina State University said: "Too often we blame lions and hyenas for decimating cheetah populations when in fact it is likely to be us humans that drive their decline. Imagine how hard it must be for a small cub to follow its mother further and further through the desert to look for food, while she herself is fighting for survival."

Another key member of the research team, Dr Gus Mills from The Lewis Foundation said: "Having spent the best part of six years studying these animals in the Kalahari you get a good understanding at first hand of the challenges they face in order to survive, even without the detrimental impact of human activity."

The Queen's-led research was carried out in partnership with Oxford University, Swansea University, Ohio State University, North Carolina State University, the University of Aberdeen, the University of Pretoria, the Chinese Academy of Sciences, The Lewis Foundation (South Africa), the South African Wildlife Research Expedition and the Zoological Society of London. It was supported by awards from the Natural Environment Research Council (NERC) and the Royal Society.

The article can be accessed via <http://www.sciencemag.org/content/346/6205/79>. The article focuses on how cheetahs burn energy and suggests that human activity may force them to expend more energy and consequently be the major cause of declining

cheetah numbers. The scientists discovered that cheetahs expend more energy when searching for prey, rather than during a prey chasing burst. So, where their prey have been reduced or re-distributed through human impacts, their ability to balance their energy budgets has been severely curtailed. The research team studied 19 free-roaming cheetahs at two sites in South Africa. A media statement from Queen's University Belfast provides more information on how the scientists calculated the cheetahs' energy expenditure and what they found. It can be accessed via <http://www.qub.ac.uk/home/ceao/News/Title,468006,en.html>. The *National Geographic* magazine also reported on the study, and can be accessed at <http://bit.ly/1sgejQ3> (Photo: Gus Mills)



Mail and Guardian chooses UP scientists as voices of science

The newspaper *Mail & Guardian (M&G)* is running a six-month project, called Science Voices, which aims to help postgraduate science students to present their academic writing in a language that is understandable and enjoyable for the general public to read. Postgraduate students submitted their articles to *M&G* and top articles were selected and published. Two PhD candidates and one MSc candidate from UPs Institutional Research Theme (IRT) on Food, Nutrition and Well-being were selected for this prestigious profile supplement, published by *M&G*.

Nokuthula Vilakati holds a PhD bursary through the IRT, while Nicolette Hall and Petrie Jansen van Vuuren are working on projects financially supported by the IRTs strategic funding. Their selection by *M&G* is evidence of the achievement of the IRT in setting out to increase UPs engagement in excellent research to address national priorities related to food security and well-being.

Pursuing her PhD through the Department of Animal and Wildlife Sciences, Nicolette Hall's study on South Africa's livestock challenges common perceptions that eating a lot of meat has many negative health implications and that high meat consumption is responsible for climate change. Hall's study also highlights the favourable role of livestock in the South African economy.

Because South African farmers focus on breeds adapted to South African conditions, for example the Nguni, Afrikaner and Bonsmara, the environmental impact is lower, due to better feeding efficiency. Hall's study also proves that red meat products are much lower in fat than initially thought. A red meat diet also reduces nutritional and mineral deficiencies, such as an iron deficiency, because red meat is high in iron, vitamin A and protein.

Apart from the nutritional benefits, Hall's study also assessed the contribution of livestock production to the economy, highlighting its role in job creation and its contribution to food supply and economic growth in the region.

Nokuthula Vilakati's study also focused on food, addressing the global issue of food shortages and a lack of dietary diversity, which results in protein energy malnutrition among many young children across the developing nations.

Vilakati addressed this problem by formulating a low cost ready-to-eat composite blend meal, using plant-based foods from locally available indigenous grains, such as sorghum and cowpea. The nutritional value of the meal is similar to that of foreign convenience foods, such as maize and soya based instant meals. Vilakati's instant meal contains 60% more protein than ordinary sorghum and cowpea and with about 15 grams of protein per 100 grams of meal, adheres to the World Health Organisation's guidelines for pre-packaged food formulations.

When mixed with hot milk or water, this tan-coloured flour in a single-serving packet offers children between the ages of two and five the energy and nutrients to meet their recommended dietary allowances. Vilakati is confident that because the meal is the same colour as the original sorghum and cowpea, there is a substantial possibility of this meal being accepted by communities.

The use of indigenous grains in producing ready-to-eat foods ensures easy accessibility for people living in rural communities. The nutritional value of these foods also matches that of food manufactured and consumed in developed communities. In addition, rural people will be more likely to consume a product that is familiar to them. Future studies will explore how these technologies can be developed at an affordable price for small-scale rural farmers. Vilakati is a beneficiary of the IFNuW fund, which enables her to complete her studies.



Mr Petrie Jansen van Vuuren

These articles, published in *M&G*, can be accessed via the internet:

Nicolette Hall's article, "Meatless Mondays might be harmful in SA": <http://mg.co.za/article/2014-08-18-meatless-mondays-might-be-harmful-in-sa>

Nokuthula Vilakati's article, "A new ready-to-eat twist on old grains": <http://mg.co.za/article/2014-08-15-a-new-ready-to-eat-twist-on-old-grains>

Petrie Jansen van Vuuren's article, "The sleeping pill that wakes up damaged brains": <http://mg.co.za/article/2014-08-18-the-sleeping-pill-that-wakes-up-damaged-brains>.

Showcasing the diversity of science, another article published by UP postgraduate candidate Petrie Jansen van Vuuren addressed a completely different theme. His novel study investigates the effects of the drug Zolpidem on brain damaged patients, using a method of brain scanning, known as SPECT (Single Photon Emission Computed Tomography), which is a unique way of imaging brain function by measuring blood flow.

Jansen van Vuuren explains that Zolpidem was originally developed as a sleeping pill for healthy individuals. If this pill is given to a brain damaged individual, "...in 5% to 6% of cases something miraculous happens. Often it's a small change, an improvement in speech, reduced muscle spasms, improved gait. In drastic cases, patients are roused from vegetative states, returning to consciousness after many months, even years, of being completely unresponsive."

This study aims to ascertain the changes in blood flow in the brain of responders' as well as non-responders' pre- and post-Zolpidem administration. As a unique contribution to science, it tries to quantify the effect of Zolpidem on blood flow with post-SPECT processing. The study is the first of its kind, as the effect of Zolpidem on blood flow through the brain has never before been quantified in humans. Its findings could have huge benefits for neurological science.

In subsequent research, Jansen van Vuuren's study will search for links between changes in blood flow and the magnitude of clinically observable responses. It will also use patient logs to determine which types of brain damage are the most likely to be improved by Zolpidem.



Ms Nicolette Hall



Ms Nokuthula Vilakati

Bites and scars help researchers to unravel whale migrations



(Heidi Etter - Namibian Dolphin Project)

With the help of detailed studies of scarring patterns, researchers from the University of Pretoria's (UP) Mammal Research Institute are unravelling the mysteries of humpback whale migrations and breeding areas of the west coast of Africa. Their recent paper (see details below) in the *Journal of Mammology* explains how they use these patterns on the bodies of humpback whales to determine migration routes between feeding grounds in the polar regions and warmer water breeding grounds.

"Whale numbers have been increasing rapidly since the end of whaling, but determining the exact whereabouts of migration routes and breeding areas remains a mystery for many stocks, including those off the west coast of Africa," Dr Simon Elwen, UP research fellow explains.

"By looking at the patterns of scarring caused by cookiecutter sharks and killer whales and comparing the number of bites and scars on whales with the known distributions of these predators, we get a better understanding of the environment the whales have travelled through before they reached our coasts, and a better understanding of where they have been," says co-author Dr Tess Gridley, a postdoctoral fellow at UP.

"We are reasonably confident that cookiecutter sharks, which look particularly gruesome and have a razor sharp set of teeth for gouging out discs of flesh, prefer living in warmer and temperate waters and avoid the shallower, colder waters of the Benguela ecosystem that characterise the western coast of South Africa and Namibia. In contrast, killer whales, which regularly attack and kill humpback whales, especially calves, live throughout the humpback's habitat. Therefore if whales are photographed with lots of fresh cookiecutter shark bites, there's a good chance they've recently passed through warm water from offshore areas and only recently reached the coast."

Using these lines of evidence, Dr Elwen and colleagues were able to determine that humpback whales seen in coastal Namibian waters during the winter months had a lot of fresh bites from cookiecutter sharks suggesting they had recently arrived at the Namibian coast directly from the warmer waters offshore of the Benguela. In contrast, humpback whales photographed off western South Africa by research associate Dr Jaco Barendse as part of an ongoing study of summer feeding humpback whales, had no fresh bites suggesting they had spent long enough migrating through the cold Benguela for bites to heal. Dr Barendse is a postdoctoral fellow at the Nelson Mandela Metropolitan University and SA National Parks.



(Simon Elwen - Namibian Dolphin Project)

"Photo-identification of scarring and colouration of tail flukes has long been used to identify individual whales and look at the movements and population size." Dr Elwen adds. "In this study we used photographic data to determine where the animals might have been before they reached our coast."

"We compared catalogues of individual whales from the different study sites, and found no matches between the population seen in western South Africa, Namibia and Gabon. However, the Namibian catalogue is much smaller as fewer animals have been seen there. We do not

think that animals are breeding in Walvis Bay or coastal Namibia (as has previously been suggested), but rather passing through on their northward migration."

This low-cost method of data collection provides valuable insight to help manage whale stocks and this information has already been presented to the Scientific Committee of the International Whaling Commission. The next step is to use genetic fingerprinting to investigate the relatedness between humpback whales found in Namibia and those seen in other locations around the African coast line.



(Tess Gridley - Namibian Dolphin Project)

Seed Science research at UP

Seed Science research, such as seed health tests, general seed pathology, seed vigour and seed germination as determined by the International Seed Testing Association (ISTA) rules is continuously performed by the UP Seed Science Group.

The Seed Science Group is led by Prof Terry Aveling from the Department of Microbiology and Plant Pathology and is part of the Forestry and Agricultural Biotechnology Institute. The research team recently moved to the newly renovated Phytotron C building on the University Experimental Farm which is equipped with two large laboratories and walk-in growth rooms.

Prof Aveling has been involved with ISTA for many years and was vice-chairman of the ISTA Seed Storage Committee (2001-2007), chairman of the Seed Health Committee for the periods 2007-2010 and 2010-2013 and is currently vice-chairman of this committee (2013-2016). The team is also involved in evaluating industry (for example, Syngenta, Bayer and BASF), and developing novel, environmentally sustainable seed treatments. The research focuses on grains, herbs, and vegetables. Some of the research forms part of an EU FP7 project, called TESTA. Prof Aveling is the leader of one of the seven work-packages.

Apart from its collaboration within the EU project, the team also maintains strong ties with the University of Almeria, Spain and the Poznan University of Life Sciences, Poland. Prof Aveling was appointed as Chairman of the Seed Pathology Committee of the International Society of Plant Pathology (ISPP) in 2013 and currently holds this position.



Members of the Seed Science group attending an international symposium in Edinburgh, Scotland earlier this year.

Prof Brenda Wingfield appointed as Acting Dean



Prof Brenda Wingfield

Prof Brenda Wingfield was appointed as the Acting Dean of the Faculty from 15 August 2014. She succeeds Prof Anton Ströh who served the Faculty as Dean for ten years. He is presently the Vice-Principal: Institutional Planning at the University.

She has been the Deputy Dean: Research and Postgraduate Studies of the Faculty of Natural and Agricultural Sciences since 2009. She is a researcher of high international

standing and received an A-rating from the National Research Foundation (NRF), effective from 2014. Prof Wingfield is also the first woman in the Faculty to receive this rating.

"In this Faculty, we constantly push back the frontiers of knowledge and develop new technology that will help the Faculty to stay in step with the challenges of a continuously changing world. As Acting Dean, I will

furthermore endeavour to enhance the postgraduate student experience and the research outputs of the Faculty and support the careers, particularly those of the young academics in science.

"I also wish to invite graduate students to become part of the exciting world of research by enrolling for postgraduate studies in the Faculty. Wonderful opportunities exist in world class, internationally acclaimed institutes and centres, such as the Forestry and Agricultural Biotechnology Institute, the Mammal Research Institute, the Genomics Research Institute, the Institute for Food, Nutrition and Well-being and the Conservation Ecology Research Unit."

She was also elected to the Council of the Academy of Science of South Africa (ASSAf) for the 2012 to 2016 cycle. Additionally, she is also the secretary general of the International Society for Plant Pathology (ISPP).

She has published more than 300 peer-reviewed articles. Prof Wingfield is one of the Research Leaders of the Department of Science and Technology/National Research Foundation (DST/NRF) Centre of Excellence in Tree Health Biotechnology, past Chairperson of the National Science and Technology Forum (NSTF) and previously the Vice-Chairperson of the Board of Trustees of PlantBio, one of the national biotechnology innovation centres.

Prof Wingfield was awarded a NSTF-BHP Billiton Awards in 2014 in the category for outstanding contribution to science, engineering, technology and innovation (SETI) through research capacity development over the past five to ten years, an award sponsored by Eskom.

She was the winner of the Department of Water Affairs and Forestry's Women in Water, Sanitation, and Forestry Research Award in 2007, the DST's Distinguished Women in Science Award in 2008 and the African Union's Women in Science Regional (Southern) Award in 2009. Prior to this award, she was recognised on four occasions as an Exceptional Academic Achiever. She was awarded the Chancellor's Award for Research in 2012.

Prof Andrew McKechnie is Acting Deputy Dean: Research and Postgraduate Studies

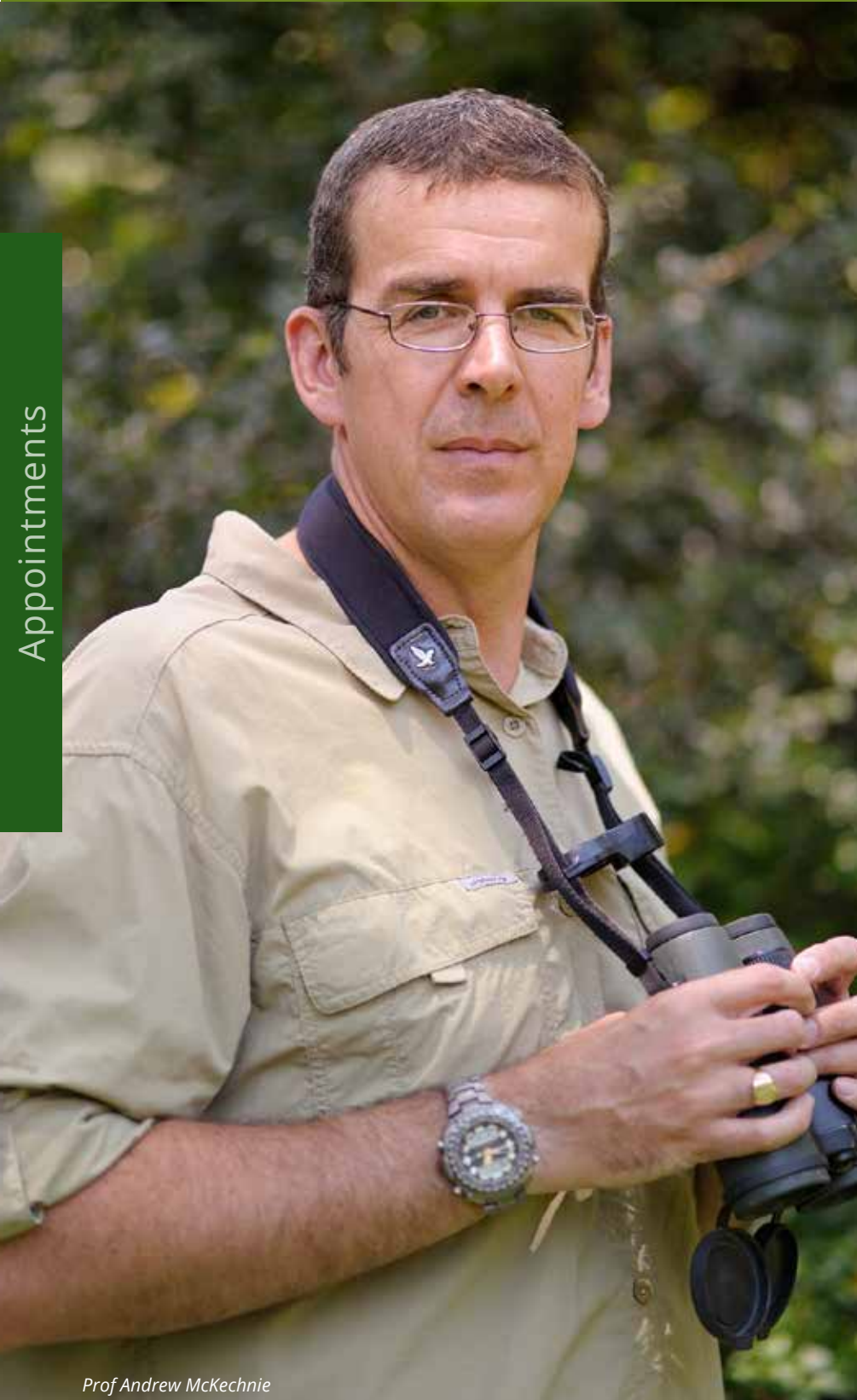
Prof Andrew McKechnie was appointed as the Acting Deputy Dean: Research and Postgraduate Studies in the Faculty of Natural and Agricultural and Natural Sciences from 15 August 2014.

He is a Professor in the Department of Zoology and Entomology at the University of Pretoria (UP). He obtained his PhD from the University of Natal in 2002, where his postgraduate research focused on the ecology and evolution of heterothermy in Southern African birds. After completing his PhD he spent two years as a postdoctoral fellow at the University of New Mexico, before returning to South Africa in 2004 to take up a position at the University of the Witwatersrand. He was appointed by the University of Pretoria early 2008 and he is also a core team member of the DST/NRF Centre of Excellence at the Percy FitzPatrick Institute of African Ornithology at the University of Cape Town.

Prof McKechnie's research is on the ecological and evolutionary physiology of birds and mammals. His work resulted in 52 publications in peer-reviewed journals, including papers in *Ecology*, *Functional Ecology*, *Proceedings of the Royal Society B*, *Biology Letters* and *Journal of Biological Rhythms*.

Prof McKechnie has received several research awards, namely the Friedel Sellschop Award for promising young researchers (Wits University), a President's Award (National Research Foundation), Exceptional Young Researcher Award (UP) and Exceptional Academic Achiever Award (UP). In 2011, he was elected as a founding member of the South Africa Young Academy of Science. He is currently associate editor for two journals, namely *Climate Change Responses* and *Emu - Austral Ornithology*, and serves on the advisory board of *Journal of Comparative Physiology B*.

"As Acting Deputy Dean: Research and Postgraduate Studies, my role is to foster the research environment that allows the Faculty's researchers to excel at both national and international levels. By providing the support our researchers and postgraduate students need in order to continue the current research trajectory in a shifting funding landscape, I aim to ensure that the Faculty continues to be the academic home of choice for postgraduate students seeking the best possible scientific training," explains Prof McKechnie.



Prof Andrew McKechnie

New Head of Geology will focus on country's energy demands

"The new research and teaching focus on Energy Resources at UP will address the energy demands of the country as South Africa's sustainable economic and human capital growth is strongly dependent on the future exploitation of its fossil energy resources." This sentiment aligns perfectly with the vision of Prof Annette E. Götz, who was appointed as the Head of the Department of Geology and Professor of Sedimentology and Energy Resources as from 1 December 2014.

Prof Götz holds an MSc (1992) and a PhD (1995) from Darmstadt University of Technology (TU Darmstadt), Germany, both of which focused on carbonate sedimentology and micropalaeontology. Before joining Rhodes University as the Geology Department's sedimentologist in 2012, she worked as Associate Professor at TU Darmstadt focussing on energy-related research with special emphasis on geothermal energy. From 2007 until 2008 she also held the position as Managing Director of the TU Darmstadt Energy Center and from 2009 until 2010 served as referee for the Ministry of Science and Higher Education, Germany.

Her research focus is on coal and hydrocarbon exploration – conventional and unconventional resources of sedimentary basins in Europe, China, Middle East, Mexico, Australia, Nigeria and Southern Africa. She is Head and Scientific Project Manager of the Karoo Research Initiative (KARIN), incorporated under the newly-established NRF-DST Centre of Excellence for Integrated Mineral and Energy Resource Analysis (CIMERA) that is co-hosted by the University of Johannesburg and the University of the Witwatersrand. KARIN aims to explore all aspects of the unconventional hydrocarbon potential within the Karoo Basin by investigating the sedimentary environments in which the potential source rocks formed and their subsequent thermal and structural history, in addition to considering the present physical nature of the potential source rocks and an environmental analysis, which will inform future exploration initiatives. KARIN also aims to equip South African postgraduate students with the necessary high-level skills to pursue research, and ultimately careers, in the area of hydrocarbon exploration and extraction.

Whilst the country has relied almost exclusively on coal from the Karoo Basin for its power needs for over a century, it has no known exploitable reserves of petroleum and very little natural gas. Therefore, the need to better understand our onshore and offshore sedimentary basin deposits and their related energy resources is very obvious. With the expertise of Prof Götz UP will provide the ideal conditions to assist in the developing graduates for international petroleum and gas companies working regionally and across the continent. Consequently, the new focus

area provides a landmark opportunity for UP to address future manpower needs in the energy sector not only in South Africa, but also regionally.

Prof Götz succeeds Prof Pat Eriksson who retired at the end of 2013 after serving seven years as the Head of the Department and more than thirty years as a renowned academic in Geology. Prof Louis van Rooy acted as Head of the Department during the interim period.



Prof Annette E. Götz



Prof Alet Erasmus ready for new challenges

Prof Alet Erasmus

"Embrace the challenges of the moment, specifically to expand the capacity of the Department in terms of student numbers, and research outputs". Prof Alet Erasmus was appointed as the Head of the Department of Consumer Science as from 1 November 2014.

Prof Erasmus further emphasised that she "wants to ensure that every individual in the Department, whether a student, or in an academic, supportive or administrative capacity, feels appreciated and understands their invaluable role in terms of the future of the Department."

Prof Erasmus is a NRF C2 rated researcher who graduated at UP. Her research topics have included matters such as household debt; consumers' ability to cope with novel technologies; consumers' perception of the service quality of selected retail establishments; global warming and sustainability issues as well as problems associated with low literacy.

In 2013, the research undertaken by a colleague and herself in collaboration with an international scholar of the Duale Hochschule Baden-Württemberg in Germany, won them the Elsevier award for the most innovative research at the EIRASS

conference in Philadelphia, USA. On two occasions for the periods 2008 to 2010 as well as 2011 to 2012. She received the local award for the best research article published in the *Journal of Family Ecology and Consumer Sciences*.

She serves on the editorial board of the *International Journal of Consumer Studies (IJCS)*, as well as the *Journal of Family Ecology and Consumer Sciences (JFECS)*, and regularly reviews for several top tier international journals. She has also acted as a guest editor for a special edition of *IJCS* in 2012. Furthermore, she serves on the NRF panel which reviews Thuthuka applications annually.

To date twenty four masters' students have completed their studies under her supervision, of which six were co-supervisions. She has done collaborative work with North West University. She has also delivered three PhD students and currently has four PhD students and eight master's degree students under her tutelage. The outcomes of these research projects as well as her personal research have been published in 56 accredited journals since 1985, of which 40 were published since 2000.

Prof Erasmus succeeds Prof Elmarie de Klerk who was the Head of the Department from 2000 to the present.



Prof Elmarie de Klerk

Prof Paul Sumner heads Department of Geography, Geoinformatics and Meteorology



Prof Paul Sumner

A seasoned geographer and researcher, Prof Paul Sumner was appointed as the new Head of the Department of Geography, Geoinformatics and Meteorology as from 1 November 2014.

Prof Sumner obtained an MSc (Geography) and a HDE from the University of Natal in 1995, and a PhD (Geography) from the University of Pretoria (UP) in 2003. With a keen interest in geomorphology, the earth-science field of geography, Prof Sumner's earlier research focussed on the paleo-geomorphology of the high Drakensberg and the landscaping processes of cold sub-Antarctic Marion Island. Later work included contributions to the application of rock weathering on rock art deterioration in southern Africa. Currently, his research has shifted to more gentle climes and centres on erosion phenomena, specifically rainfall erosivity attributes, on Mauritius and the off-shore islet Round Island. He has supervised some 15 doctoral and master's students and produced around 50 publications on these diverse physical geography topics.

He is an NRF C2-rated researcher and was also recognised as a UP Exceptional Young Researcher in 2005.

As a geographer, Prof Sumner recognises the diversity and strengths of the Department of Geography, Geoinformatics and Meteorology (GGM). These three disciplines provide the core focus for teaching programmes that include the PLATO-accredited geoinformatics programme, meteorology training for the weather service, as well as geography and the inter-disciplinary environmental science programmes.

At a postgraduate level, the Department has strong programme links to the UP Centre for Environmental Studies. These training programmes provide for increasingly active postgraduate research activities which Prof Sumner wishes to continue strengthening in the future. The Department is currently ranked in the top 150 in its subject area (QS rankings) and, through on-going fostering of the research profile the Department is well positioned to improve on this ranking within the next few years.

Prof Sumner is an International Journal Editorial Board Member of *Geosciences* (Scientific & Academic Publishing, USA), International Journal Associate Editor of *Geografiska Annaler Series A Physical Geography*, Sweden, Special issue on southern African Geomorphology, 2013 Issue 4, as well as Local Journal Co-editor of the *South African Geographical Journal* (Jan. 2007- Dec 2011, Editorial Advisory Board: 2012 onwards and Journal Subject Editor (Geography) of *University of Mauritius Research Journal: Science and Technology* July 2006-2010.

Prof Hannes Rautenbach steps down as the Head of the Department after eight years. He was the Head of GGM from 2006 to the present, while also being the Acting Director of the UP Water Institute from 2010 to 2013 and was appointed as Director of the Institute from 2013 to 2017. From now on Prof Rautenbach will focus on the development of a newly established Laboratory for Atmospheric Studies (LAS), in collaboration with Eskom and Sasol, as well as with the South African Weather Service (SAWS). He completed his PhD in Meteorology in 1999 at UP and is currently rated as a C2-rated scientist.



Prof Hannes Rautenbach

New Director for Centre for Wildlife Management appointed



Prof Michael Somers

Prof Michael Somers, an expert on African carnivores, specifically African wild dogs, has been appointed as the new Director of the Centre for Wildlife Management (CWM) in the Faculty. He succeeds Prof Wouter van Hoven.

Prof Somers' interests are broad and he has worked on aspects of the ecology of the otter, mongoose, hyena, lion, serval, cheetah, jackal and a number of other taxa such as spiders, insects and crabs. A specific interest is the reintroduction of large carnivores and he has edited two books related to this topic (Hayward & Somers, 2009, *Reintroduction of top-order predators*, published by Wiley-Blackwell, and Somers & Hayward, 2012, *Fencing for conservation*, published by Springer). Much of the work was done in KwaZulu-Natal but a student also helped with research further afield (in Botswana, Mozambique and Zambia). Prof Somers is also interested in invasion biology, which has some similarities to reintroduction biology, and he is a Core Team Member for the DST-NRF Centre of Excellence for Invasion Biology. He is also a member of the Mammal Research Institute (MRI) at the University. Prof Somers completed his PhD in Zoology in 2001 at the University of Stellenbosch.

As Director of the CWM he wants to implement a student centred teaching approach in the

Centre. "By this we aim to have our students leave the Centre for Wildlife Management equipped with the spirit, mind-set and process skills necessary to be leaders in the wildlife industry. The excellent staff of the CWM is making this possible and so we have begun to achieve this and will continue on this path. [Furthermore] we aim to make the CWM research centric, increasing our publications and their impact. This is being done by increasing our research associates in number and capacity, having interns and increasing our collaborations internally with the MRI and others, locally in Southern Africa and also abroad. We are entering discussions for collaborations with institutions in Namibia and Botswana to further increase our and their capacities. The wildlife industry has grown and is still growing substantially, in the private sector but also in the formal government conservation driven sector. The CWM has an opportunity to benefit from and grow with this [growth], and also contribute to [it]," Prof Somers explained.

Prof Somers has served on numerous local and international wildlife-related bodies and on editorial boards as editor-in-chief, associate editor or guest editor of journals such as *South African Journal of Wildlife Research*, *Small Carnivore Conservation*, *PloS ONE*, *Koedoe*, *PeerJ*, and *Journal of Mammalian Biology*.

Prof Mapundi Banda appointed in Mathematics Department



Prof Mapundi Banda

Professor Mapundi Banda was recently appointed as a Full Professor in Mathematics in the Department of Mathematics and Applied Mathematics in the Faculty of Natural and Agricultural Sciences.

Prior to his appointment he was a professor at the University of Stellenbosch. He completed his PhD studies at the Darmstadt University of Technology, Germany. He gained two master's degrees, MSc in Computing Science at the Imperial College, University of London and an MSc in Industrial Mathematics at the University of Kaiserslautern, Germany.

Professor Banda's current NRF rating is C1. His research interests include the analytical transition of kinetic models (Boltzmann-Type models) to continuum flow models in the small Mach or Knudsen number limit. The numerical transition is achieved by applying tools from asymptotic analysis, such as multi-scale methods, as well as ideas from relaxation systems of conservation laws.

Former Head of Department of Biochemistry passed away



Late Prof Leon Visser, Prof Danie Strydom and Prof Braam Louw (Department of Biochemistry)

It was announced that Emeritus Professor Leon Visser, former Professor in Biochemistry passed away on 26 September 2014, after a short illness.

He was a former Head of the Department of Biochemistry at the University of Pretoria from 1983 to 1997 and retired at the end of 1998. He was a senior researcher at the CSIR, where he did research on snake venom toxins for nearly eight years before joining the University of Pretoria. His initial BSc (Agric) and MSc (Agric) degrees in Biochemistry were both obtained with distinction at the University of Pretoria in 1959 and 1963, respectively. He was a lecturer in Biochemistry at the University of Natal, Pietermaritzburg from 1963 to 1974. During this time he received a bursary to conduct his PhD studies in Biochemistry at Harvard Medical School, Boston, Massachusetts, which he completed in 1969 and was also a visiting lecturer at the Harvard and Duke Universities, USA in 1974.

Prof Visser's main research interest centred on the biophysical properties of proteins and immunology and his work was published over several decades in international journals and as contributions

to congresses. He served as research adviser to the Natal Institute of Immunology for many years and played a leading role in the South African Biochemical Society (now SASBMB) as council member, secretary and congress organiser. He was passionate about the development of students as bona fide researchers and academics and many of his former students became academics at local and international universities.

He was part of the panel that developed MLB 111 as a compulsory course presented by the Departments of Biochemistry, Genetics, Microbiology and Plant Pathology, Botany and Zoology for all first-year biological students at the Faculty of Natural and Agricultural Sciences. He also played a leading role in moving the Department of Biochemistry in 1995 from the Old Agricultural Building to the New Agricultural Building. He was a leader from his youth onwards and served *inter alia* as chairperson (1956-58) of Kollege Huis (now Klubsaal) and the Central Rag Committee (1959).

He is survived by his wife, Ebbie, two children and grandchildren.

Climate change and stress addressed at international workshop

Prof Coleen Vogel, an expert on climate change from the Department of Geography, Geoinformatics and Meteorology recently attended two international workshops where she represented the University of Pretoria.

The first meeting was organised by several hosts, including the African Centre for Strategic Studies and the Environmental Change and Security Programme. The CSIR in Pretoria also fulfilled a key hosting and facilitating function.

Given climate stress and climate change, the meetings dealt with the securitisation of water in Africa. Prior to the meeting, a research paper was prepared, followed by a presentation as part of a panel discussion at the Woodrow Wilson Centre. Prof Vogel was a panel member at the Woodrow Wilson Centre Africa Programme Workshop in August 2014 and presented inputs on water security. Other delegates of the

panel discussions held in Washington included amongst others, the executive secretary of the Lake Chad Basin Commission, the Global Water Partnership and secretary of AMCOW and UNEP.

The title of the panel in which Prof Vogel participated was: "Pre-empting environmental and human security crisis in Africa: science-based planning for climate variability threats". Coverage of the event can be found on <http://www.newsecuritybeat.org/2014/09/scarcity-coleen-vogel-reframing-water-security/> as well as on https://www.flickr.com/photos/africa_center/sets/72157646612382976/.

The second meeting was organised by the CGIAR, a global partnership that unites organisations engaged in research for a food secure future, the CGIAR's Climate Change, Agriculture and Food Security Programme, as



Prof Coleen Vogel

well as Future Earth. Other partners present included representatives from the Food and Agricultural Organisation of the United Nations, the International Livestock Research Institute and the International Food Policy Research Institute. This meeting was convened to examine the value of Governance and Institutions for Climate Change Resilient Food. The meeting was held in Brussels, Belgium.

Prof John Taylor delivered keynote lecture at IUFoST Congress

Prof John Taylor from the Department of Food Science and Research Theme Leader for Functional Biomolecules and Foods in the Institute of Food, Nutrition and Well-being recently delivered a keynote lecture at the World Food Science and Technology Congress of the International Union for Food Science and Technology (IUFoST), held in Montreal, Canada.

He is also a Fellow at the International Academy of Food Science and Technology. The topic of the lecture was 'Developments in improving the quality of gluten-free bread made from non-wheat cereals through modification of their starch and protein properties'.

According to Prof Taylor, there are compelling reasons to develop technology to produce high quality bread from non-wheat cereals. Many people suffer from coeliac diseases,

intolerances to wheat-type grains, or allergies from wheat. In Africa, rapid urbanisation results in a huge demand for the convenience of bread. However, wheat cannot be widely cultivated due to adverse climatic conditions. Current gluten-free bread, which is made primarily from starches plus hydrocolloids, although technically successful, is only an interim solution. It is of poor nutritional quality and it is too expensive to be a staple food in developing countries.

He stated that on-going research at several centres indicates the possibility of a game changer that will enable scientists to make pan-type bread from cereals such as maize and sorghum. The key is modification of the flour starch and prolamin proteins. Natural sourdough fermentation can improve starch functionality, enabling it to better hold the leavening carbon dioxide. Forming a wheat-



Prof John Taylor

like dough from non-wheat proteins is described as the 'Holy Grail' of gluten-free breads. The genetic modification of the prolamins as well as their chemical modification can alter the properties of the maize zein and sorghum kafirin so that they exhibit visco-elastic properties, similar to gluten. The success of this research would help to reduce wheat related diseases in Africa, and globally.

Sensory food science research that resonates in Africa

Sensory food science is a cross-disciplinary research area that focuses on the situations in which people use food products. The development of safe, affordable, nutritious products that meet the food preferences of consumers requires a skilful consideration of the sensory properties of such products and an understanding of the drivers of food choice.

Prof Riëtte de Kock from the Department of Food Science recently delivered a plenary lecture, titled 'Sensory food science research that resonates in Africa', at the World Food Science and Technology Congress of the International Union for Food Science and Technology (IUFOST) held in Montreal, Canada, in August. In the lecture, Prof De Kock explained why sensory food science is critical for food security and economic development in the developing world, particularly in Africa.

According to Prof De Kock it is a known fact that consumers expect a wide choice of food that is safe, enjoyable to eat, nutritious and of consistent quality. Provided that the food is safe, how enjoyable it is to eat, is usually the most important factor that will determine the consumer's choice of food. This is a valid fact, especially in higher-income, developed regions of the world. However, in the growing, more

urbanised low-income consumer markets in developing regions of Africa, the expectations of consumers present a challenge to agriculture and food manufacturing systems. It also offers huge economic potential for food businesses, and gives rise to an urgent need for innovative food science research, as well as an entrepreneurial spirit to increase the production and utilisation of locally relevant and underutilised food sources.

Insight into traditional processing methods, combined with comprehensive physico-chemical, microbiological and descriptive sensory profiling of products, are the first steps towards commercialising authentic acceptable African food products.

Prof De Kock's sensory food science research aims to address the need for food product development to meet the demands of a growing and more urbanised African population in transition. Her research also focus on the exploration of the incredible richness of sensory experiences in foods from Africa's bio-diverse food sources, as well as the tailoring of the sensory properties of foods to make them not only nutritionally adequate, but also appealing and appetising.



Prof Riëtte de Kock

NZG a golden opportunity for research in Mathematical Biology



Prof Jean Lubuma (second from left) with the delegation at the National Zoological Gardens

BIOMATH Coffee, an initiative of the SARChI Chair in Mathematical Models and Methods in Bioengineering and Biosciences (M³B²), is an informal weekly interdisciplinary research gathering during which ideas are exchanged among mathematicians, biologists and their postgraduate students. The meetings take place every Tuesday in the Old Botany Building at the University of Pretoria.

Early in October 2014, Prof Jean Lubuma (chair of SARChI M³B²) led a delegation of 17 members of the BIOMATH Coffee group on a visit to the National Zoological Gardens (NZG) in Pretoria. The visit was coordinated by Dr Helene Brettschneider from the NZG. The visitors enjoyed a rich programme that involved a tour of the NZG facilities (including the Biological Data and Sample Bank, the Centre for Conservation Science and the Centre for Wildlife Health) and short research presentations. During the visit, avenues were paved for collaboration between UP and the NZG on topics ranging from bovine tuberculosis in a human-buffalo population to disease epidemics such as the current Ebola epidemic in West Africa. It also became evident that the scientific research conducted on wildlife at the NZG can provide the real data essential to validating mathematical models.

Nobel Laureate celebrated science on Mandela Day

'Scientists love what they do and every day there is the possibility that they might discover something new and exciting,' said Prof Martin C Michel, welcoming everybody to the Mandela Day Public Lecture on 18 July 2014.

Prof Michel, Global Head of Product and Pipeline Scientific Support at Boehringer Ingelheim, introduced American Nobel Prize Laureate and physiologist, Prof Brian Kobilka, who delivered the keynote address at the University of Pretoria.

The title of Prof Kobilka's address was *Challenges in drug discovery for G-protein coupled receptors*.

According to Prof Kobilka, cells communicate with each other in the body through the production of molecules which activate receptors on the target cell. The biggest family of receptors is called GPCRs because they signal through G-proteins. He explained that GPCRs mediate a fantastic range of signals using photons (visible light) to detect brain transmitters, hormones and even small ions like calcium. 'About half of all the treatment drugs we have for diseases target GPCRs, but this is only about 10% of all GPCRs so there are amazing possibilities to treat many more diseases through GPCR-targeted drugs.'

Prof Kobilka is a professor in the departments of Molecular and Cellular Physiology at Stanford University School of Medicine. He is also the co-founder of ConfometRx, a biotechnology company focusing on G-protein coupled receptors. He was named a member of the National Academy of Sciences in 2011.

He has been a pioneer in determining the structures of GPCRs, which is helping scientists to understand how GPCRs work, and in the endeavour to develop new drugs for many diseases including heart disease, obesity, diabetes, high blood pressure and many cancers. One of the GPCR targets is HIV/Aids because this GPCR is used by the virus to enter human cells.

In recognition of Prof Kobilka's contribution to understanding the structure of GPCRs and their mechanism of action, he received the Nobel Prize for Chemistry in 2012.



From left: Prof Robert Millar (Director: Mammal Research Institute), Prof Stephanie Burton (Vice-Principal: Research and Postgraduate Studies), Prof Brian Kobilka and Prof Anton Ströh (Former Dean: Faculty of Natural and Agricultural Sciences, now Vice-Principal: Institutional Planning)



Prof Brian Kobilka

UP students organise first DuPont Plant Breeding Symposium in Africa



Prof Anton Ströh, Vice Principal for Institutional Planning (left) officially opened the symposium with some of the plenary speakers, sponsors and students.

The first DuPont Plant Breeding Symposium to be held on African soil was recently hosted by the Genomics Research Institute (GRI) at the University of Pretoria (UP). A team of postgraduate students (Ronishree Mangwanda, Erik Visser, Jonathan Botha, Ncobile Kunene and Mieke Haasbroek) from the Department of Plant Science, the Department of Genetics, the Forestry and Agricultural Biotechnology Institute (FABI) and the Genomics Research Institute (GRI) took on the challenge of organising the symposium. The theme was 'Genomics of crops and pathogens for molecular breeding' and was chosen to highlight the importance of genomics for molecular breeding of crops and to showcase the expertise in this field at UP.

The series of DuPont Plant Breeding Symposia is aimed at stimulating dialogue and collaboration in the field and was started in 2008 in the USA, with events being held for the first time in China, India and Africa this year. The team of UP students was given a budget by DuPont and the task to make all arrangements for the symposium, including the selection and hosting of speakers, website design and logistics. A website was set up for the symposium (www.dupontafriapbs2014.co.za), the programme was also made available through a mobile App, and the presentations were made publicly available in real time through a Webinar.

The symposium was opened by Prof Anton Ströh, Vice-Principal: Institutional Planning, UP. International plenary speakers were Dr Geoff Graham, Vice-President: Hybrid Crop Product Development, DuPont Pioneer; Dr Peter Freymark: Research Lead for Africa, DuPont Pioneer; Prof Yves van de Peer: Department of Plant Systems Biology, Ghent University VIB, Belgium (and holding a joint appointment at GRI, UP); and Prof Brian Steffenson: Lieberman-Okinow Endowed Chair of

Cereal Disease Resistance, Department of Plant Pathology, University of Minnesota, USA. Local plenary speakers were Dr Rikus Kloppers: PANNAR SEED; Dr Renée Prins: Director, CenGen (Pty) Ltd (a molecular breeding service company); and Prof Dave Berger: Department of Plant Science and FABI, UP. Several UP postgraduate students completed the programme with talks and posters on their research.

The symposium brought plant breeders, government officials, researchers, students and academics together to discuss the impact of genomics research on plant breeding. The student organising committee received many accolades from local and international guests for their teamwork and the efficient way in which they arranged an excellent symposium. This affirms the quality of postgraduate education at UP during which time the students are also encouraged to develop so-called 'soft skills' that are critically important in the job market today.

Dr Freymark had this to say about the student committee that organised the symposium: 'The event was well organised and attracted high-calibre speakers. It is encouraging to see the next generation getting involved to solve the greatest food security challenge of tomorrow's generation – feeding 9 billion people.'

Hosting the first DuPont Plant Breeding Symposium in Africa stems from long-standing and continuing collaborations in crop genomics and plant pathology between Prof Dave Berger and others at the University of Pretoria and Dr Rikus Kloppers of PANNAR SEED (now part of DuPont). Discussions are ongoing with DuPont on growing the partnership through continued symposia and joint research initiatives to address the challenges in food security on the African continent.

UP hosts Second International Powdery Scab Workshop



Prof Jacquie van der Waals (back left) with delegates during the Second International Workshop on powdery scab on potatoes

Powdery scab, caused by the plasmodiophorid *Spongospora subterranea* f.sp. *subterranea*, is an economically important soil- and seed-borne disease of potatoes worldwide. The pathogen causes root galling, which impairs water and nutrient uptake. Furthermore, it causes tuber lesions resulting in rejection of seed stocks or processing potatoes, and downgrading of ware potatoes.

Abstracts from the workshop are available from Prof Van der Waals: jacquie.vdwaals@up.ac.za

The Second International Workshop on powdery scab on potatoes was held in Pretoria recently, hosted by Prof Jacquie van der Waals from the Department of Microbiology and Plant Pathology. Relatively few researchers work on this disease, perhaps due to the challenges in dealing with an obligate parasite.

Regular workshops on powdery scab were established to allow researchers to network, share knowledge and determine research needs. The first workshop of this kind was held ten years earlier in the USA, with European Powdery Scab Workshops taking place in Switzerland in 2007 and 2011, respectively.

The recent workshop in South Africa was attended by 17 researchers and students from Australia, France, Germany, New Zealand, Scotland, South Africa, Switzerland and Zimbabwe. The small, informal group was conducive to the exchange of ideas and in-depth discussions. One of the days was spent on a field trip to the potato growing region of the Loskop Valley. All the delegates were duly impressed by the scope and organisation of agriculture in the area.



Examples of powdery scab on potatoes

UP hosts SASAS National Congress

Many awards for UP academics at AEASA conference



The SASAS Northern Branch organising committee

The University of Pretoria recently hosted the Annual National Congress of the northern branch of the South African Society for Animal Scientists (SASAS). The theme of the congress was 'The role of the animal scientist in ensuring future food security'.

Delegates from various countries attended the presentations on new research in the fields of animal science and agriculture. The plenary sessions, held in the morning, were presented by the main speakers, while concurrent afternoon sessions were held for the respective disciplines. Speakers of note included Dr Ken McGuffey, Dr Frédérique Chaucheyras-Durand, Prof Don Cowan and Prof Celia Abolnik.

Social get-togethers at the end of each day offered delegates the opportunity to interact and meet new contacts. On Sunday a first-ever student quiz, sponsored by the magazine *Veeplaas*, was held. Teams from the universities of Pretoria, Stellenbosch and Fort Hare, as well as the Agricultural

Research Institute competed in the quiz. The quizmaster was the entertaining Mr Paul Bevan, who amused the crowd with his witty remarks. The Dominant Alleles, one of two UP teams, were the overall winners.

On Monday evening delegates were treated to a braai and social at the Voortrekker Monument's amphitheatre. On Tuesday evening delegates attended a gala dinner during which various prizes were awarded to members of industry who have made significant contributions in the field of animal science. Prof Carl Roux received the SASAS gold medal for his contribution to the animal science industry. On Wednesday visiting delegates were taken on an excursion tour to the Faculty of Veterinary Science at Onderstepoort and the ARC Biotech platform.

All delegates agreed that this year's very successful congress had been highly enjoyable and informative. The SASAS Northern Branch can be proud of their hosting such a stellar event.

Agricultural economists from all over South Africa and its neighbouring countries gathered outside East London in the Eastern Cape for the 52nd Annual Agricultural Economics Association of South Africa (AEASA) Conference, held from 28 September to 1 October 2014. The conference was attended by 238 delegates and the University of Pretoria's Department of Agricultural Economics, Extension and Rural Development was well represented.

The Department of Agricultural Economics, Extension and Rural Development organised a workshop to discuss South Africa's land reform policy. The key presenters were Prof Johann Kirsten, Prof Charles Machete, Dr Ward Anseew (all from UP) and Dr Dirk Troskie (from the Department of Agriculture, Western Cape). Prof Hans Binswanger-Mkhize was one of the keynote speakers at the conference and presented a thought provoking paper on South African land reform. Prof Charles Machete was the main speaker during a plenary session and his presentation was titled 'The state of agriculture in SA – 20 years since democracy'.

One third (11 out of 36) of the papers presented at the AEASA Annual Conference were presented by members of UP's Department of Agricultural Economics, Extension and Rural Development, who were among those who were rewarded during the awards ceremony. Tracy Davids received an award for Best Master's Thesis for her paper titled 'Playing chicken: the players, rules and future of South African broiler production'. Karlien van Zyl, Hester Vermeulen and Johann Kirsten received a prize in the category Best Paper Published in *Agrekon* for 2013/14 for their paper titled 'Determining South African consumers' willingness to pay for certified Karoo lamb: an application of an experimental auction'. Tinashe Kapuya (with Wandile Sihlobo), a PhD student, was awarded the second prize in the category Best Contributed Paper for his paper titled 'South African maize exports: a strategic export market analysis model approach'.

Two volcano experts from UP attend conference in Indonesia

Two delegates from the University of Pretoria (UP) were the only representatives from the African continent who attended the biennial Cities on Volcanoes conference in Indonesia in September this year. The conference was organised by the *International Association of Volcanology and Chemistry of the Earth's Interior (IAVCEI)*.

Dr Nils Lenhardt and his PhD candidate, Gert-Jan Peeters from the Department of Geology, presented their research on the active Rungwe Volcanic Province in Tanzania. Their attendance was made possible by travel grants from IAVCEI and UP's Faculty of Natural and Agricultural Sciences. Dr Lenhardt was one of the conveners of the session titled, 'Understanding the past and future behaviour of volcanoes: combining geology, history and archaeology to improve hazard assessment'. The other conveners included researchers from the University of Oxford, Arrhus University, the Institut de Physique du Globe in Paris, and the British and United States Geological Surveys. All in all the conference was very successful and helped raise UP's international reputation among members of the volcanological community.

Volcanology, which studies the characteristics of volcanoes, is important to researchers and policy makers. However, many developing countries where active volcanoes are found (including Africa with its 150 Holocene volcanoes) lack the technologies required for true research. The biennial Cities on Volcanoes conferences therefore play an important role in increasing cooperation among countries in the efforts to improve volcanology and disaster mitigation.

This year's conference was held at the foot of the active Merapi volcano. The theme was 'Living in harmony with volcanoes: bridging the will of nature to society'. The conference was attended by 485 scientists from 39 countries who gathered to discuss research and technology related to volcanoes and disaster mitigation. The conference comprised 42 topical sessions, ten workshops and nine field trips to different volcanoes. Opportunities were also created for exchanging ideas with communities and politicians.



A) The proceedings were opened by IAVCEI officials

B) Mr Gert-Jan Peeters in front of his poster presentation

C) The conference venue on the campus of Gadjah Mada University, Yogyakarta, Indonesia

Photos: Nils Lenhardt

Animal Science student wins prestigious prize

Rone de Klerk, currently an MSc student in the Department of Animal and Wildlife Sciences became the third student in three consecutive years from this Department to win the Koos van der Merwe/Animal Feed Manufacturers Association (AFMA) prize.

This prize commemorates the contribution of the late Dr Koos van der Merwe to the feed industry in South Africa. This award goes annually to the best final year graduate student in Animal Nutrition in a specific year to further his/her studies in the following year. The award is only awarded to a student who has already registered for postgraduate studies in Animal Nutrition.

The winner of the Award also receives a certificate, a cash prize and the opportunity to present his/her master's degree research at the annual AFMA symposium. Rone de Klerk presented her research during October with the title "The effect of exogenous protease enzymes on performance and gut health in the grower pig".

Elna Swart won the award for 2012/2013, and An Jacques won it in 2011/2012.



Rone de Klerk

UP awards bursaries to boost science

The University of Pretoria (UP) has a long and proud tradition of being one of the main sponsors of the annual Eskom Expo for Young Scientists, during which the Faculty of Natural and Agricultural Sciences awards bursaries to outstanding Grade 11 and 12 candidates.

This year UP bursaries were awarded to two Grade 11 learners. In the category for Microbiology and Biochemistry, Bernard Smit, a learner from the Hoërskool Waterkloof in Pretoria, was awarded a bursary for his project entitled 'Magnetotactic bacteria with a Faraday application', and in the Agricultural Sciences category a project entitled 'Worm tea: an ecological solution to agricultural issues' ensured a bursary for Avuyile Mabangatha from East-London. The bursaries, which are for the amount of R25 000 each, will cover their first year of study in the Faculty of Natural and Agricultural Sciences in 2016.

The national finals of the Eskom Expo for Young Scientists provide a unique opportunity for young minds with bright ideas to showcase their research and ingenuity in the fields of science, technology, engineering, mathematics and innovation (STEMI). This initiative is aimed at encouraging academic excellence in STEMI education. Each year South Africa's brightest and most promising young scientists and engineers are brought together to celebrate their achievements and to encourage them to pursue their interest in science and technology.



Avuyile Mabangatha



Bernard Smit

Zoology student also an excellent angler



Amanda Adlam

A final-year Zoology student, Amanda Adlam may enjoy working with animals, but angling is her real passion.

Amanda was born and raised in Bulawayo, Zimbabwe and moved to Pretoria in 2011 to study Zoology. At the moment she is finishing her BSc (Zoology) in the Faculty of Natural and Agricultural Sciences. She has been fishing from an early age, but her international angling career started in 2006 where she represented the junior Zimbabwean team in bank angling. Since then, she has competed in seven tournaments, and has received both her provincial and Zimbabwean colours for the junior and senior ladies bank angling, as well as the senior boat angling colours. Amanda has also received Tri-nations zone 6 colours three times, which is the highest honour an angler can obtain. During this year's Tri-nation Angling Tournament, which was held at the Hardap dam in Namibia, she won the bronze medal, finishing fourth on day one, second on day two and first on day three. She was also the first senior Zimbabwean woman to achieve an individual ranking.

MSc student win international prize for poster

Deon de Jager, a second-year master's student in Biotechnology was awarded one of five poster prizes for young scientists at the 10th International Congress on Extremophiles, hosted in St Petersburg, Russia in September. The prize included includes a certificate and medal from the International Society on Extremophiles and a cash prize.

His poster was entitled "Metagenomic Gene Discovery" with Dr René Sutherland (co-supervisor) and Prof Don Cowan (supervisor) as his co-authors. He is doing his research for his master's degree in the Department of Genetics at the Centre for Microbial Ecology and Genomics (CMEG).

Deon's research focused on identifying novel genes involved in stress-tolerance of microorganisms in the Namib Desert soil, by functionally screening a metagenomic (or environmental DNA) library constructed from this environment in *E. coli* (dr Sutherland constructed the library). Microorganisms that survive in hot desert soils are adapted to extreme environmental conditions, such as high temperatures, desiccation (or low water availability), increased UV irradiation and oxidative stress induced by desiccation.

Several clones that are resistant to increased levels of sodium chloride (NaCl) in the growth media, which attempted to simulate the low water availability of Namib Desert soil, were identified from the metagenomic

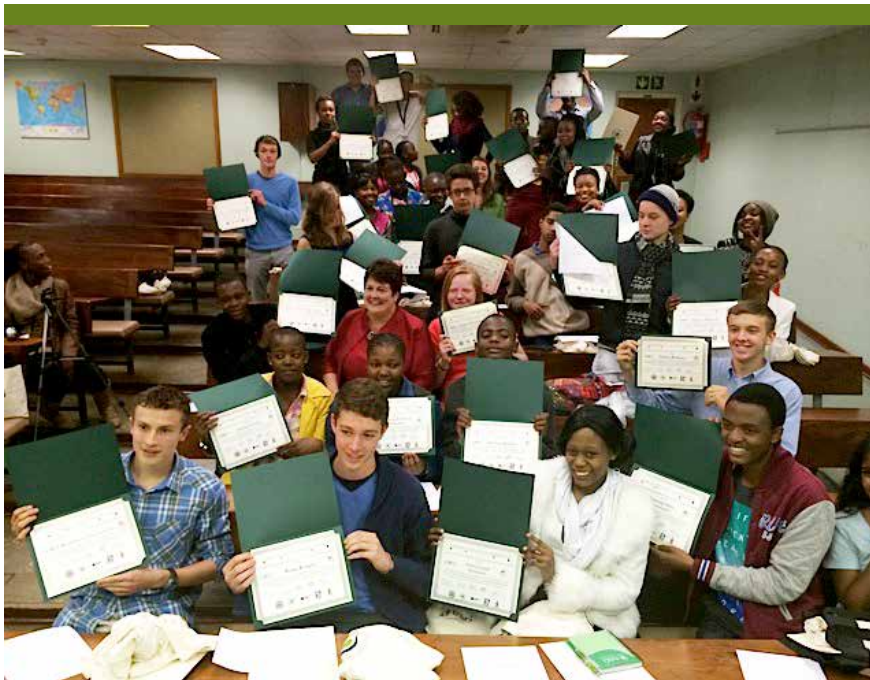


Deon de Jager

library. The metagenomic DNA of these clones was sequenced (at the ion Torrent facility at the University of Pretoria) and individual genes potentially responsible for conferring salt-tolerance were investigated further.

Environmental microbial communities, particularly from extreme environments, represent an untapped reservoir for the identification of novel genes and the encoded proteins/ enzymes involved in stress-tolerance that could be applied in industrial biotechnology, medicine, agriculture or other commercial enterprises.

Hands-on inspiration for learners to study geographic information science



Learners showing off certificates they received from the Deputy Chief of Mission of the US Embassy, Ms Virginia Palmer, at the closing ceremony of the 2014 GCE MyCOE TechCamp.

A Global Connections and Exchange: My Community, our Earth (MyCOE) Youth TechCamp was hosted at the Centre for Geoinformation Science, University of Pretoria (UP) during July this year. The programme aims to provide opportunities for the youth to learn more about online geotechnologies and how to apply them in the service of their communities. At the same time, a deeper understanding about different places and cultures of the world is encouraged. The MyCOE TechCamps are arranged by the Association of American Geographers (AAG), with funding and support from the US Department of State Bureau of Educational and Cultural Affairs, Youth Programs Division. In 2014, MyCOE Youth TechCamps were held in South Africa, Bolivia and Panama.

The 2014 MyCOE Youth TechCamp in South Africa was more than a technical experience for the learners and facilitators: it brought together young and old, people from different backgrounds, cultures and continents. Thirty-seven learners attended the camp: ten learners flew in from the US to join local high school learners from three different provinces in South Africa. All of them were between the ages of 15 and 18. Most of the learners have geography as a subject at school and were selected through a competitive application process. Learners from both countries came from a variety of backgrounds: private and public schools, rural and urban areas, advantaged and disadvantaged schools. Some were computer literate and even had won GISc awards, while others had hardly ever touched a computer. The main aim of integrating these learners was to initiate skills, and cultural exchange.

The TechCamp exposed learners to various career opportunities in Geographic Information Science (GISc). The ten days included practical hands-on sessions in computer labs, field trips to Freedom Park, the Cradle of Humankind and Dinokeng. Inspiring talks were delivered by

well-known environmental scientist, Prof Coleen Vogel from UP, and the geologist and speleologist, Roger Ellis. Learners worked in groups to complete a project that applies geotechnologies to solve a real world spatial planning problem related to water resource management, climate change, pollution, dolomite and sinkholes in the Centurion Lake area. They used Gauteng datasets, such as satellite imagery, a digital elevation model (DEM), street networks and geological data, and acquired basic GIS skills, such as digitising, spatial analysis and map composition, by using QGIS and ESRI Story Maps.

Local organisers, EIS-Africa and AfriSpatial, joined forces with the Centre for Geoinformation Science and JuniorTukkies at UP to make the week a memorable experience. AfriSpatial arranged the technical and educational programme of the week. UP postgraduate Geoinformatics students provided technical GISc assistance in the UP Goldfields computer lab and also served as chaperones to the learners for the entire week. JuniorTukkie provided the logistics to make sure that learners were well rested, had transport and experienced South African hospitality and culture. Representatives from EIS-Africa, AAG and the US State Department intermittently joined the programme during the week and presented each learner with a certificate of successful completion at the closing ceremony.

EIS-Africa, AfriSpatial and the UP's Centre for Geoinformation Science are keen to build on the success of the 2014 GCE MyCoE Techcamp and host a similar event in 2015. Organisations keen to participate and/or sponsor participants from disadvantaged communities to attend a camp in 2015 can contact Sives Govender sgovender5@csir.co.za, Bridget Fleming bridget@afrispatial.co.za or Serena Coetzee serena.coetzee@up.ac.za for more information.

Postgraduates breaking boundaries

The Postgraduate Student Association for the Natural and Agricultural Sciences (PSANA) held a potjiekos social in September. Many of the Faculty's diverse departments were well-represented on the day. Postgraduate students in Biochemistry, Physics, Genetics, Geography, Geo-informatics and Meteorology, Chemistry, Food Science, Consumer Science, Plant Science, Plant Pathology, Plant Production and Soil Science, Zoology, Microbiology, Statistics, and Mathematics engaged in a festive afternoon – despite the misconceptions of departments being afraid to step out of their 'comfort zones'.

PhD, MSc and honours students participated in a fierce and competitive game of "Ultimate Frisbee", which included many moments of laughter and jokes. For others, this was the perfect opportunity to relax after many long hours of research – leisurely conversing around a fire, all in merry spirit.

Jeandré Johnson, a student from the Department of Food Sciences, along with others, prepared four delectable potjies to cater for every taste. For those that were vegetarian, a hearty and flavoursome butternut potjie and brinjal potjie were prepared. Those enjoying a lighter, yet, satisfyingly meaty option were given a choice of dried apricot and chicken curry pot or a spinach, cheese and chicken potjie. Finally for the traditionalists, that is, the red meat lovers, an original braised beef potjie soaked in cabernet sauvignon was served.



Experimental farm has 'show-and-tell' at School for Cerebral Palsied Learners

Animal Science students involved in the small stock section of the Experimental Farm recently organised an excursion to the Pretoria School for Cerebral Palsied Learners. The school caters for children with various degrees of mental and physical disabilities, usually as a result of damage to the central nervous system.

The excursion involved taking a sheep ewe and her week-old lambs, as well as some foster lambs and goat kids, to the pre-primary section of the school for a practical "show and tell" experience. During the weeks preceding the excursion, the young learners at the school were taught about the different livestock species, and the products that they produce for human consumption. This included wool from sheep as a textile to produce clothing. The show-and-tell was the practical side of the lessons.

For many of the learners at the school, touching a live animal is a very big emotional experience. Some found it very easy, and immediately came over to touch and pet the ewe and the lambs, while other took a little more encouragement. The children also had an opportunity to bottle feed the lambs and kids. Quite a few could not contain their joy and elation at feeding the lambs and kids. By the end of the morning, every child had the opportunity to stroke one of the animals, and with a little motivation, each one did. The teachers took some photos for the parents, and some parents were even present, able to capture the special moment between the child and animal. The excursion will now have a yearly standing, and we hope to continue aiding in the emotional development of the children at the school.



Children crowd around the pen with the ewe and her lambs, as well as some goat kids, eager to touch them.



Carla Rittonori, an MSc student from the Department of Animal and Wildlife Sciences, holding a lamb for the children to pet.

Students rewarded at BIOMATH 2014

The Department of Mathematics and Applied Mathematics at the University of Pretoria (UP) enjoys a strong and fruitful collaboration with the Bulgarian Academy of Sciences (BAS). UP's Profs Roumen Anguelov and Jean Lubuma have, for many years, been co-organising the International Conference on Mathematical Methods and Models in Biosciences (BIOMATH) and the Young Scientists School in Sofia, Bulgaria in collaboration with Prof S Markov and Prof S Pesheva (BAS).

According to an article titled *Biology + Maths = LIFE*, was published in the Bulgarian newspaper *Azbuki*, 'traditionally, the participation of scientists from RSA and USA is the strongest'. In this regard 2014 was no exception, and South Africa's ambassador in Bulgaria, Ms Vanessa Calvert, even gave a speech at the opening ceremony. BIOMATH 2014 was attended by a large delegation from the UP Department of Mathematics and Applied Mathematics. Ms Claire Duffourd and Mr Yibeltal Terefe, two of our PhD students who gave presentations received awards for being part of the top three awardees.



The UP delegation at BIOMATH 2014

Postgraduate Chemistry students win awards



Students at the prize-giving ceremony with Dr Patricia Forbes (left)

Three UP Analytical Chemistry postgraduate students won prizes for their presentations at Analitika 2014. This Conference was held at Khaya iBhubesi in Parys (Free State) during September.

Sifiso Nsibandé, a MSc student, supervised by Dr Patricia Forbes, won the Best Student Poster Award in the field of mass spectrometry, and the Best Student Oral Award in the field of chromatography.

Eve Kroukamp, a PhD student also supervised by Dr Patricia Forbes, won the second prize for her poster in the field of mass spectrometry, and Wonder Nxumalo, who is an MSc student, supervised by Dr Yvette Naude, was awarded the second prize for his poster in the field of chromatography.

Tuks awarded the first Student Chapter of SIAM in South Africa



Prof Jean Lubuma, current Faculty Advisor of the UP Chapter of SIAM, and student officers Ms Claire Dufourd (President), Mr Zakaria Ali (Vice-President), Mr Usman Danbaba (Secretary) and Mr Gray Manicom (Treasurer)

The first-ever Student Chapter of the Society for Industrial and Applied Mathematics (SIAM) in South Africa has been awarded to the University of Pretoria (UP).

Since its establishment in 1952, SIAM has distinguished itself as an international champion for innovation and excellence through publications, research and community service. SIAM publishes 16 of the top ISI journals.

In 1979, SIAM introduced the Student Chapter of the SIAM programme which, through a variety of activities and initiatives, aims to encourage students, in particular

postgraduate students, to take an interest in applied mathematics and computational science. Currently SIAM has 141 Student Chapters worldwide.

The UP Chapter of SIAM intends to raise students' awareness of the crucial importance of mathematical sciences for the development of the country, and of the fact that all the skills listed in the South African National Scarce Skills List are dependent on mathematics. They also want to generate interest in mathematics by providing students with opportunities to share their ideas and enthusiasm with fellow students and academics from relevant departments

at the University of Pretoria. Furthermore, they want to explore career opportunities in and beyond South Africa, make contacts and initiate worthwhile collaborations.

Some of the benefits enjoyed by student members are eligibility to receive free student membership of SIAM, certificates of recognition for outstanding service to the Chapter, financial support for the Chapter's activities and participation in SIAM's annual meetings.

To read more, go to: <http://www.siam.org/students/chapters/current/upretoria.php>

Chemistry postgraduate student wins SAAWK prize

Cara Slabbert, a PhD student, supervised by Dr Melanie Rademeyer, received the third prize in the Chemistry session of the annual Studentesymposium, hosted by the "Suid-Afrikaanse Akademie vir Wetenskap en Kuns" (SAAWK) at the Florida Campus of Unisa on 7 November, for her oral presentation titled "Veel fasette van kwik(II) in eendimensionele haliedgebrugde polimere van d10 metaalkationen met N-bensopiridien en -pirasien tipe ligande".



Cara Slabbert (right)

New UP with Science learners spoiled during their winter week

A new group of 50 Grade 10 learners, Group Q, officially joined the UP with Science family during the past winter.

The learners and their parents were welcomed by Prof Brenda Wingfield in the Auditorium at Sci-Enza. After lunch Group Q departed to the UP Experimental Farm where Mr Roelf Coetzer showed them the dairy farm and some sheep- and goat-farming activities and gave them an opportunity to gain first-hand experience of the classification of wool. Dr Diana Marais from Plant Production and Soil Science introduced them to the Brassicaceae family, the different varieties of cabbage and the ways in which they are cultivated. They made a quick stop at the Plant Sciences facility, where Mr Daniel Bilankulu told them about the biggest cycad collection in the Southern Hemisphere, hosted by the University of Pretoria.

During the rest of 'winter week', the group visited the different departments in the Faculty of Natural and Agricultural Sciences. On Monday morning they attended an interesting lecture presented by Prof Jan Verschoor from Biochemistry and in the afternoon they visited the Department of Zoology, where they learnt about the research done on Marion Island. They spent Tuesday in the Department of Physics with Mr Johan Janse van Rensburg and his team, who taught them about light and showed them how to make a spectroscope. The highlight of the day was when they made their own instant nitrogen ice-cream! Wednesday was Chemistry's turn to impress the learners and Mr AJ van Rensburg and his fellow students taught the group how to synthesise Aspirin and demonstrated the distinctive colours of the flames created when different metal salts burn. This was followed by some cloth dyeing and the group played around with chromatography to determine the colour composition of different dyes used in sweets.

On Thursday the group was taken on a day trip to the Tswaing Crater by Dr Miranda

Deutschländer from the Department of Plant Science and Mr Victor Tibane from Geology. There they learned about the geology of the area and the plants found at this ancient meteorite crater site. They ended the week at Food Science, where they saw how milk from the Experimental Farm is pasteurised and were allowed to make their own hot chocolate. In the afternoon they were given a glimpse of what awaits them in Grade 11 when the current Grade 11 group presented the results of their research projects.

The group also visited In2Foods, where Ria Odendaal and her team introduced them to the various hydroponic systems used in the cultivation of lettuce, as well as the preparation and packaging of various pre-packed salads. After enjoying a picnic lunch on the farm the learners returned to campus to spend the afternoon at Agricultural Economics with Melissa van der Merwe and her team. They had so much fun that they almost forgot to go home!



Mr Daniel Bilankulu showed the learners the biggest cycad collection in the Southern Hemisphere, hosted by UP.



Learners had the opportunity to visit the UP Experimental Farm where they could experience the dairy farm and see sheep and goats

UP students excel in Agbiz competition

Students from the Department of Agriculture Economics, Extension and Rural Development participated in the Agribusiness Chamber (Agbiz) Competition hosted during the Agbiz Congress. The competition provided an opportunity for sixteen top students from major universities across the country to compete in a contest where they had to analyse a real-world case and to develop strategic recommendations for addressing key issues related to the case. Here are some of the things that the students said about their experiences:

"The competition provided me with an opportunity to practically apply what I have learnt in the classroom, which was enlightening." **Ikageng Maluleke** (won the award for the best team effort).

"Participating in it helped me to think outside the box and apply some of the skills I have learnt." **Etienne Kruger** (was in the overall runner up team).

"The competition gave me grounding in public speaking on a grand scale." **Ayanda Demana**, who was a leader of the overall winning team.

The winning team consisted of Ayanda Demana, Scelo Mshengu, Christian Schlotveldt and Manfred Venter. The runner-up team consisted of Etienne Kruger, Lindelani Makhuvhu, Karabo Motau and Jan-Hendrick Strauss. Ikageng Maluleke, Lunga Njara, Johann Boonzaaier and Herman Lombard were the team that won the prize for the best teamwork effort.

The four outstanding individual students in the competition were Manfred Venter, Ayanda Demana, Stuart Knott and Karabo Motau.



Best Teamwork Effort



Outstanding Individual Students



Runners Up



Winning Team

UP student involved in development of real-time thermal monitoring system for SA's first ever LLR telescope

While the Hartebeeshoek Radio Astronomy Observatory (HartRAO) lunar laser ranging (LLR) telescope is expected to be operational around 2016; a group of postgraduate students from different South African universities have already started working jointly on various phases of the massive LLR project as part of their studies. In particular, Mr Philemon Tsela, an academic staff member from the Department of Geography, Geoinformatics and Meteorology and also a PhD candidate is responsible for developing a real-time thermal monitoring system for the LLR telescope under the supervision of Prof Ludwig Combrinck. Major collaborators in the LLR project include NASA/ USA, OCA/France and the NRF/SA.

Over the past 40 years, the occasional placement of corner cube retroreflectors (CCRs) on the lunar surface led to the evolution of the LLR technique which provides high-precision distance measurements between the earth and moon. Placement of the CCRs on the lunar surface was done by the manned APOLLO 11, 14 and 15 as well as the unmanned Soviet rover Lunakhod 1 and 2 missions. These optical retroreflectors consist of reflective prism faces that return an incident laser beam to its original direction and as a result, provide the only means to measure the Earth-Moon distance with the laser ranging technique.

In particular, accurate Earth-Moon distance measurements which are delivered by LLR offer potentially more comprehensive solutions for accurate tests of the Einstein General Relativity theory, gravitomagnetism, geodetic precession, and other parameterised post-newtonian tests. Currently, there are only four operating LLR stations globally that acquire data regularly and are all located in the Northern hemisphere (i.e., McDonald/USA, Observatoire de la Côte d'Azur (OCA)/ France, APOLLO/ USA and Matera/Italy). The LLR telescope being developed at HartRAO/ South Africa would be an addition to the list of operating LLR stations and thus contribute to global ranging data.



Actual representation of the external metallic structure of the LLR telescope at HartRAO.



The Associate Director at HartRAO and extraordinary professor at UP, Ludwig Combrinck, poses next to the front-end of the optical support structure of the LLR telescope at HartRAO.



Mr Philemon Tsela next to the optical support structure of the LLR telescope at HartRAO