



UNIVERSITEIT VAN PRETORIA  
UNIVERSITY OF PRETORIA  
YUNIBESITHI YA PRETORIA

# SQUARED<sup>2</sup> UP

2016  
December

Issue 2

Newsletter of the  
Faculty of Natural and  
Agricultural Sciences

[www.up.ac.za](http://www.up.ac.za)



*Dung Beetles (Photo: Caitlyn Nauschutz)*

*Story on page 22.*

## NAS researchers excel at 2016 NRF Awards

The annual National Research Foundation (NRF) Awards recognise and celebrate South African research excellence. Awards are presented to researchers in two categories, namely special recognition awards and ratings-linked awards. This year two researchers from the University of Pretoria (UP) in the Faculty of Natural and Agricultural Sciences (NAS), Prof Pedro Crous and Prof Nigel Bennett also did the Faculty proud.

The special recognition awards provide a platform for honouring researchers for career achievements and contributions to knowledge creation and dissemination, as well as capacity development and transformation. The ratings-linked awards are given to researchers who have qualified for an A or P rating, as evaluated through the peer review-based NRF rating system. Several of UP's top researchers received recognition during the recent NRF awards ceremony.

In terms of ratings-linked awards, UP is proud to announce that it now counts even more A-rated researchers among its staff. A-ratings are awarded only to researchers who are recognised by their peers as leading international scholars in their respective fields, for the high quality and impact of recent research outputs. The new A-rated researchers are Prof Erika de Wet (SARChI Professor of International Constitutional Law in the Faculty of Law) and Prof Pedro Crous (NAS).

**Prof Pedro Crous** is a professor in the Department of Microbiology and Plant Pathology and is involved with the Forestry and Agricultural Biotechnology Institute (FABI) at UP. As a phytomycologist, his main interest lies in the evolution and phylogeny of plant-pathogenic fungi. Prof Crous is also the Director of the Centraalbureau voor Schimmelcultures (CBS) (Fungal Biodiversity Centre), an Institute of the Royal Dutch Academy of Arts and Sciences in Utrecht, the

*Continued on page 3*

# Message from the Dean

Under the circumstances, the University of Pretoria did extremely well. Thank you for your team effort which directly contributed to the successful completion of the academic activities. Despite turbulent times, the past two months were characterised by the good performance of our undergraduate students during the examination without compromising the standards, as well as the finalisation or submission of more than 70 dissertations and 45 theses. The recent NRF evaluation outcomes also included high ratings achieved by emerging researchers (also read the article on page 1 about the achievements of the Faculty at the Annual National Research Foundation Awards).

As always, we are very proud of the outstanding achievements of our staff members. **Dr Michelle Greve** from the Department of Plant and Soil Sciences was selected as a Young Affiliate of The World Academy of Sciences Regional Office for sub-Saharan Africa (page 8). A record number of five Plant Pathologist PhD students under the supervision of Prof Lise Korsten graduated at the recent Spring graduation ceremony (page 4). **Prof Hettie Schönfeldt** and **Prof Este van Marle-Köster**, both from the Department of Animal and Wildlife Sciences were respectively presented with the SASAS President's Award and a SASAS Silver Medal (page 15).

Three new heads of departments, **Prof Andrew McKechnie** (Zoology and Entomology) (page 46), **Prof Vinesh Maharaj** (Chemistry) (page 44) and **Prof Este van Marle Koster** (Animal and Wildlife Sciences) (page 43) were appointed in the past few months.

Our students also did us proud. **Ntombi Gama**, a PhD student in Biochemistry won a prestigious fellowship from the Department of Science and Technology (DST) at the 2016 Women in Science Awards (WISA) ceremony (page 14), while **Amelia van Schalkwyk**, a master's student in Mathematical Statistics was selected as one of the fifteen 2017 SAS Student Ambassadors (page 11).

Through multidisciplinary research, as well as teaching and learning endeavours in the Faculty, we aim to make the world a better place. Innovative research on the ability of small animals to adapt to

changing environmental conditions will be fostered by means of the new Small Animal Physiological Research Facility at the University (page 36).

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

You have to energise yourself since we expect you to be more innovative in 2017. We wish everybody a well-earned festive season!

**Prof Jean Lubuma**

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



## Editor

Martie Meyer (Editor)

[martie.meyer@up.ac.za](mailto:martie.meyer@up.ac.za)

012 420 5498 (office)

012 420 5895 (fax)

Room 8-9

Agricultural Sciences Building  
Faculty of Natural and Agricultural Sciences

## Layout and Design

Kim Zimmerman

ReDzign

084 296 0884 or [kim@redzign.co.za](mailto:kim@redzign.co.za)

## Language Editing

Melodie Veldhuizen

Special mention to **Louise de Bruin** and **Ansa Heyl** as academic writers

Please send your comments on the newsletter or suggestions/ideas for articles to [martie.meyer@up.ac.za](mailto:martie.meyer@up.ac.za)



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

This year has been extremely challenging. The Vice-Chancellor, Prof De la Rey, confessed that her job description has changed during this exceptional year. This also happened in our Faculty – our job descriptions changed dramatically. I am impressed by the distinctive and innovative manner in which you coped with this situation, particularly over the past few months. Our academic staff walked the extra mile in all aspects, especially where alternative teaching, learning and assessment approaches were needed. Our academic and support staff and students sacrificed a lot to accommodate the extreme circumstances. We are extremely grateful for your dedication and that all institutional structures emphasised that postgraduate education is the backbone of our vision to be a research-intensive university.

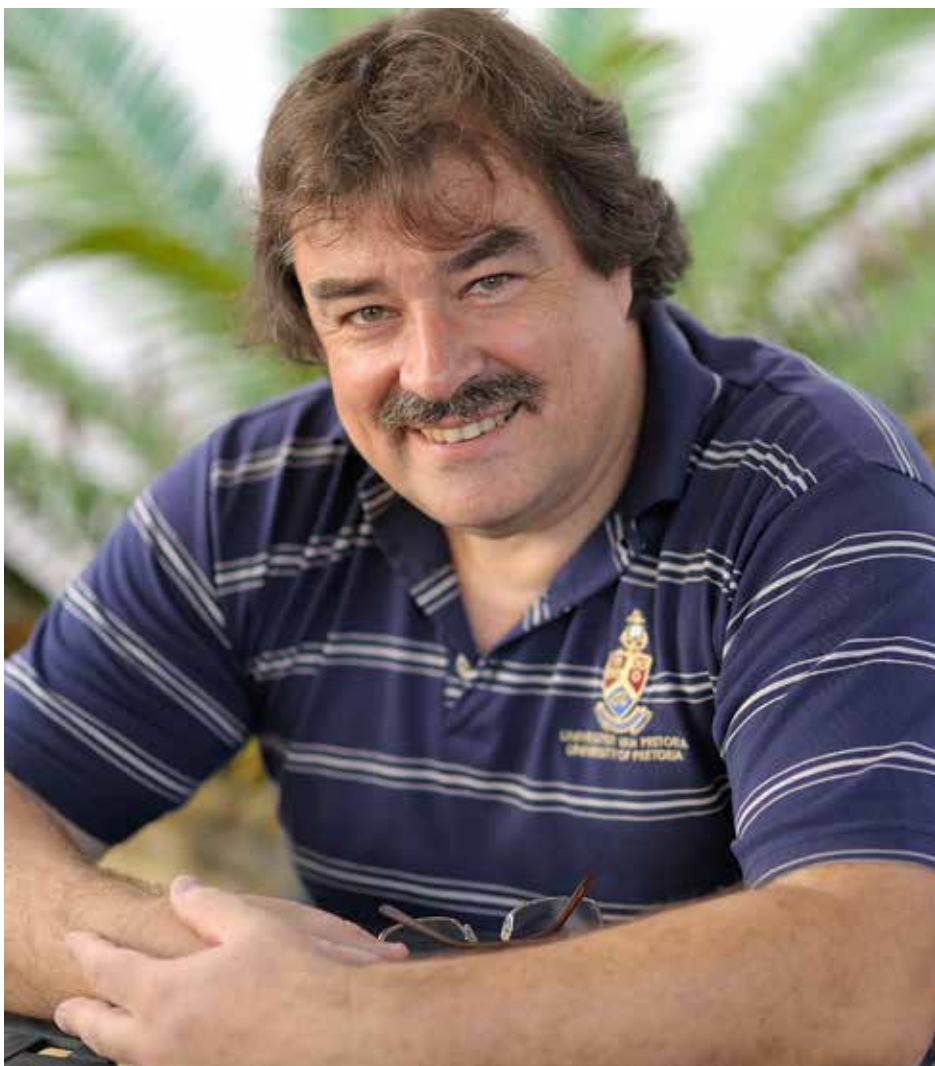


Netherlands. Additionally, he serves as professor at the universities of Utrecht and Wageningen, both in the Netherlands.

Prof Xiaohua Xia (Director of the Centre of New Energy Systems in the Faculty of Engineering, Built Environment and Information Technology (EBIT) at UP and **Prof Nigel Bennett** were re-awarded the A-ratings they have held for a number of years.

Prof Bennett occupies the joint Department of Science and Technology (DST) / National Research Foundation (NRF) Research Chair in the field of Mammalian Behavioural Ecology and Physiology, as well as the UP Austin Roberts Chair of African Mammalogy. His research is focussed on ecology, and animal physiology and behaviour. His research has set the benchmark for our understanding of the phylogenetic and ecological constraints that regulate reproductive success and social evolution in mammalian species.

As a leading research intensive university, UP is extremely proud of its academic excellence and the contributions of its researchers to finding solutions to local and global challenges.



*Prof Nigel Bennett*



*Prof Pedro Crous*

# Five PhD graduates for Prof Lise Korsten

A record number of five Plant Pathology PhD students under the supervision of Prof Lise Korsten graduated at the recent Spring graduation ceremony. This was the highest number of PhD students graduating under one researcher's supervision in the Faculty of Natural and Agricultural Sciences, at a graduation ceremony.

**Joseph Charles Arthur**, a pioneer American plant pathologist and mycologist once said: "Plant pathology has become a utilitarian science of vast possibilities". This achievement emphasises his view.

The five graduates, with the title of each one's PhD thesis in brackets, are:

- Mr Bill Malick (*The role of postharvest thyme oil-based alternatives on simulated induction of defense mechanisms in avocado (Persea Americana Mill.) for the control of anthracnose (PhD Crop Protection)*)
- Mr Mbulaheni Mutengwe (*Pesticide Residue levels and estrogenic activity of fresh produce in South Africa (PhDCrop Protection)*)
- Mr Mosimanegape Jongman (*Quality and safety of rainwater in food production systems (PhD Plant Pathology)*)
- Ms Annancietar Gomba (*Food safety and microbial biomes of the citrus carpophane (PhD Crop Protection)*)
- Ms Willeke de Bruin (*Effect of nonylphenol, an industrial endocrine disruptor chemical, on the germination and development of Cos Lettuce (Lactuca sativa) (PhD Plant Pathology)*)

Prof Korsten was also the co-promoter of Ms M P Makgolane, a MSc Agric Plant Pathology student. The title of her dissertation is *Combined use of plant growth promoting rhizobacteria and pesticides for the control of Fusarium crown rot of wheat*.



Front: Annancietar Gomba, Prof Lise Korsten, Prof Jean Lubuma (Dean: Faculty of Natural and Agricultural Sciences), Mbulaheni Mutengwe and Willeke de Bruin. Back: Bill Malick and Mosimanegape Jongman



# PhD student in Genetics receives International Norval-Young Award

An academic brilliant student, whose master's degree was of such a high standard that it was upgraded to a PhD, was recently awarded the 2016 Society of Tropical Veterinary Medicine (STVM) Norval-Young Award. Luise Robbertse, a PhD student in the Department of Genetics received this award at the Joint International Conference of the Association of Institutions for Tropical Veterinary Medicine (AITVM) and the STVM, organised by the Institute for Parasitology and Tropical Veterinary Medicine at the Freie Universität Berlin, Germany.

The award was established to honour the memory of Dr Andy Norval and Dr Alan Young, two distinguished researchers who made enormous contributions to the present understanding of tick-borne diseases in the tropics. Both these scientists were dedicated to student participation, encouragement and support and it was to honour these ideals that this award was created. The award is presented every two years to one candidate, recognised to be a leading young mind in the field of Tropical Veterinary Medicine.

Ms Robbertse received the Norval-Young Award based on her work completed during her BSc (Hons) degree, under the supervision of Prof Christine Maritz-Olivier. The title of the study is: "Genetic diversity, acaricide resistance status and evolutionary potential of a *Rhipicephalus microplus* population from a disease-controlled cattle farming area in South Africa". This work was published as an invited research article in a special edition of the International journal, *Ticks and Tick-borne Diseases* in 2016. In addition to producing high quality scientific outputs, Ms Robbertse is passionate about translational science and believes that research should not be conducted for the sake of research only, but to contribute to the improvement of quality of life for both animals and humans.

This study was the first to describe the status of acaricide resistance against synthetic pyrethroids and amitraz in the Mnisi area of Mpumalanga, a resource poor area with government-funded communal dip-stations. Evidence of the presence of a high frequency of alleles that contribute to resistance was provided and used for the development of new strategies for effective tick control in these heavily infested areas. Negotiations with the Department of Agriculture, Forestry and Fisheries and industry (Zoetis South Africa Pty Ltd) took place during September 2016 and are currently in progress to establish a strategic plan for improved tick control. This involves researchers from Prof Maritz-Olivier's tick research group at UP, state veterinarians, farmers and industry. These findings will therefore soon be effectively converted into real-life actions impacting animal health, ensuring food security in livestock-dependant areas and uplifting resource poor communities via knowledge-based implementation of protective tick control strategies.

Ms Robbertse obtained a BSc (Medical Sciences) and a BSc Hons (Genetics) degree from the University of Pretoria. Her current PhD study, under the continued supervision of Prof Christine Maritz-Olivier, focuses on the comparative immunoprofiling of three economically important cattle breeds, following *Rhipicephalus microplus* infestation. During her PhD studies she ultimately aims to unravel the complexity of the immune responses underlying the interphases between ixodid ticks and their bovine hosts to improve adjuvant selection and antigen production strategies for vaccine development against *Rhipicephalus* cattle ticks.

Ms Luise Robbertse

# CMEG students' honours research published in peer-reviewed journals

Three students from the Centre for Microbial Ecology and Genomics (CMEG) at the University of Pretoria (UP) recently had their honours research published in international peer-reviewed journals. Ms Storme de Scally, Mr Felix Oloo and Mr Andries van der Walt all completed their honours degree at the Department of Genetics in 2015. Their work was respectively published in *Soil Biology and Biochemistry*, *Scientific Reports* and *Applied and Environmental Microbiology*. Work submitted to these journals is extensively reviewed and it often takes more than six months from submission to final publication.

At the CMEG, researchers study some of the most abundant organisms found on the planet – microorganisms. Because these organisms are not found in isolation in nature, researchers use a combination of molecular techniques, dubbed 'meta-omics', to determine the entire microbial species composition found within a given sample from the natural environment. Microbial communities are large contributors to processes involved in climate change, and they are especially dominant within 'less complex', extreme environments, including hot and cold deserts, such as the Namib Desert and Antarctica, deep sea hydrothermal vents, sub-Antarctic regions, such as the Argentinian peat bogs, and marine systems, such as the Southern Ocean. Studying these climatically extreme environments enables scientists to discover how micro-organisms interact with each other and drive global processes such as drawdown of carbon from the atmosphere – the process that once filled our planet's atmosphere with life-giving oxygen.

Under this theme, Ms De Scally based her research on the Antarctic Dry Valleys. This region of Antarctica features average air temperatures below -15°C and is one of the driest regions on the planet, receiving less than 100 mm of precipitation per year. Because plants and animals cannot withstand these extreme conditions, micro-organisms dominate the Dry Valleys' soil environment. However, this environment is changing, owing to climate change and global warming. Ms De Scally's research, published in *Soil Biology and Biochemistry* assessed the impact that future temperature increases may have on these microbial communities.

Her work is reassuring in that it found the communities to be resistant and functionally stable, showing no significant shifts in response to changing temperatures. However, this is not the full story, as her study was only conducted over a short period of time and there are many other factors that may influence how microbial communities react. Ms De Scally is currently working on her MSc in genetics, in which she again addresses the influence that climate change may have on microbial communities, but this time looking at the effect of a decrease in ocean pH on Southern Ocean micro-organisms. She plans to pursue a career in academia and has a bright future ahead of her, having already won the Best Oral Presentation prize at the South African Society for Microbiology Biennial Congress earlier this year.

Mr Oloo moved closer to the equator for his research, working on the peat bogs of Tierra del Fuego in Argentina. Peat bogs are wetlands which accumulate peat – decomposing carbon-rich plants. However, the large amount of dead plant material and the cold temperatures prevent decomposition from occurring quickly enough to keep up with the addition of new dead plant material. Because of this, micro-organisms play large roles in maintaining the carbon balance, and if the 'wrong' micro-organisms come to dominate, this can lead to a massive release of carbon into the atmosphere in the form of methane. The work published in *Scientific Reports* evaluated how microbial communities differ among various 'zones' in the peat bogs – plant-free areas, vegetated areas and decomposing areas. Mr Oloo and his colleagues found that local environmental factors determine which micro-organisms dominate in each zone. Since completing his research, Mr Oloo has decided to broaden his horizons and is currently employed by Barclay's Africa as a data analyst. He is on his way to making a global impact, as during his short time as an honours student, he not only published in an international peer-reviewed journal, but was also the vice-president of the student society Enactus, a community involvement programme targeted at improving the world we live in.

Mr Van der Walt conducted his research a bit closer to home, working on the fairy circles of the Namib Desert. Fairy circles are round, random, barren patches of soil in an area normally dominated by grasses. For decades, scientists have been wondering what causes this phenomenon. Some say that it is termites, some think that it is seepage from underground, while others are of the opinion that plants are able to organise themselves in this way. The work done by Mr Van der Walt and his colleagues, published in *Applied and Environmental Microbiology*, argues that the fairy circles are caused by micro-organisms. The authors found some micro-organisms inside fairy circles that are not present elsewhere, some of which are known to cause plant diseases. In his MSc in bioinformatics Mr Van der Walt is further expanding this research, this time not only looking at what is present, but also at what they are doing. He says that he wants to stay in academia and would eventually specialise in astrobiology, the study of life on other planets.



From left: Mr Andries van der Walt, Mr Felix Oloo and Ms Storme de Scally



# Bianca Verlinden one of GradStar Top 100 Future Leaders

Dr Bianca Verlinden, a postdoctoral fellow in the Department of Biochemistry, was recently selected as one of the Top 100 Future Leaders of South Africa (~3 500 applicants), as part of the 2016 GradStar Awards Program.

In order to be awarded a place in the Top 100, Dr Verlinden went through a stringent four phase judging process that assessed the applicant's level of leadership, academic achievement, creativity, communication and collaboration. The GradStar Program strives to recognise the best and brightest graduates and future leaders emerging from South African universities and provides an aspirational platform to assist graduates in achieving their full potential.

The 2016 Future Leaders represented 14 universities. From these universities the University of Pretoria had the largest representation of students in the Top 100, with just more than 30%. Students representing the Natural and Agricultural Sciences who also received Top 100 status were Andine Erasmus, Betty Kwati, Clare Boswell, Dimpho Sekhaolelo, Liesl Visser, Tshiamo Makinta and Zaleekhah Dawood.

# UP with Science students win silver at Eskom Expo

Learners from local high schools were recently invited to participate in mini-research projects hosted by the Department of Genetics at the University of Pretoria.

The aim of the programme is to provide learners the opportunity to actively engage in real science, and experience the realities of the field as microbial ecologists do. Researchers from the Centre for Microbial Ecology and Genomics under the direction of Dr Thulani Makhalanyane, supervised six learners as representatives of the Genetics Department. They collected and analysed water from three dams in Pretoria (Hartebeespoort, Roodeplaat, and Rietvlei) in order to investigate the pollution levels in South African dams.

Two learners from the group were selected to present their findings at the provincial and national levels of the Eskom Expo for Young Scientists. Jacqueline Janse van Rensburg and Zamazimba Madi won a gold award at provincial level and a silver award nationally. Their prizes included bursaries to the value of R 30 000 study at a South African university and an opportunity to win an all-expenses-paid trip to Amsterdam, London and the USA to attend various science fairs pending the outcome of interviews.



Dr Bianca Verlinden



Jacqueline Janse van Rensburg and Zamazimba Madi

# Dr Michelle Greve selected as a TWAS Young Affiliate

A dynamic young lecturer from the Department of Plant and Soil Sciences, Dr Michelle Greve was recently selected as a Young Affiliate of The World Academy of Sciences Regional Office for sub-Saharan Africa (TWAS ROSSA). This event was hosted by the Academy of Science of South Africa (Pretoria).

This affiliateship lasts for a period of five years, and she will be invited to participate in TWAS general meetings and conferences. She will assist TWAS to respond to the needs of young scientists in developing countries.

Dr Greve is a senior lecturer at UP. In 2011 she completed her PhD on the diversity and distribution patterns of African vegetation at macro-ecological scales at Aarhus University in Denmark. Her research reflects her interest in biogeography, which is an understanding of how patterns of diversity and distribution of organisms have come about, what these patterns tell us about the evolutionary drivers of these patterns, and how we can use this information for conservation prioritisation, with a particular focus on the Southern Hemisphere. Her work significantly contributed to the understanding of the biogeography of the region, but has also advanced the field of biogeography conceptually. Dr Greve is currently running a research programme that aims to better understand alien invasions to the Sub-Antarctic islands, using a trait-based approach. Another project investigates the interdependencies of the ecology of birds and trees in Southern Africa. Both projects endeavour to understand these questions at different spatial scales.

Dr Greve has published in journals such as *Nature Communications*, *Global Ecology and Biogeography* and *Journal of Biogeography*, and her work featured in scientific and in the popular media. She has been awarded a Y1 (Promising Young Researcher) rating from the National Research Foundation. Additionally, she is an affiliate of the Tuks Young Leadership Programme at UP.

Each year each of the five TWAS Regional Offices select up to five scientists younger than 40 to be TWAS Young Affiliates for a period of five years. TWAS initiated its affiliateship category for young scientists in 2007. At the end of the five-year affiliateship, the status of 'TWAS Young Affiliate' is changed to 'TWAS Young Alumnus'.



Dr Michelle Greve



# Food Science receives state-of-the-art hygiene facility

PHT-South Africa, a subsidiary of the global hygiene and technology company with the same name headquartered in Germany recently donated a high end three-part hygiene facility worth R350 000 to the Department of Food Science. This hygiene system (Mano Complete Type 23765/23775) installed at the entrance of the food processing pilot plant consists of three parts. The first part provides optimal hand sanitation, including synchronised hand hygiene, contact free activation and paperless hand drying. This leads to a log 5 (50 000 bacterial cells) microbial load reduction. The second part consists of an automated non-contact sensor-activated hand washing basin for washing and drying hands inside the processing plant. The last part is a sole cleaning system, equipped with rotating brushes with detergent for removing soil on shoes or boots.

The launch of this system took place at the Annual South African Society for Dairy Technology (SASDT) Students' Dairy Evening in August. As a sponsor of the event, PHT-South Africa's Director, Mrs Deléne Boshoff, mentioned how proud she was as an alumna of the Department of Food Science, to reciprocate, especially at a time when it is crucial to expose students to the latest food processing and hygiene technologies. This would familiarise students to advances in the sector prior to joining the food processing environment. "In Germany, it is customary for food companies to partner with education and training institutions through provision of equipment and training. So on one of my visits to that country I decided to donate the state-of-the-art equipment to UP. I called the Head of Department to enquire whether if it was feasible," Mrs Boshoff said.

On her part, the Head of the Department, Prof Elna Buys, mentioned how having such an advanced system – the first of its kind in South Africa – will expose students to the highest level of hygiene standards within food processing. The system reinforces the commitment that companies such as PHT-South Africa have in building capacity within food science in South Africa. They echo the 'public-private' partnerships as seen in many national and international development goals.

The evening also saw oral presentations from four honours, one master's and two doctoral students whose research topics had a direct link to food safety within the dairy industry. Ms Rufaro Nduna (honours), Mr Richard Beardsley (master's) and Mr Thulani Sibanda (doctoral) took home prizes for best presentations in their respective groups. The evening culminated in a networking and interaction evening over dinner with dairy industry professionals and students.



*One of the students testing the high end three-part hygiene facility at the Department of Food Science*

# Dr Jongman won GLOBALGAP Best Poster Award

Dr Gape Jongman, a postdoctoral fellow in the Department of Plant and Soil Sciences recently won an award for the best poster at the \*GlobalGAP Summit 2016. He received a fully sponsored trip to Amsterdam as part of the GlobalGAP Young Academics Programme, to attend the Summit.

According to Prof Lise Korsten from UP's Department of Plant and Soil Sciences, Dr Jongman was lauded by the CEO of GlobalGAP, Kristian Moeller for the commendable presentation of his poster.

Dr Jongman holds a BSc and an MSc (Applied Microbiology) degree from the University of Botswana. He was previously employed by the University of Botswana as a lecturer.

In his thesis titled, *Quality of water in food production systems*, Dr Jongman researched the impact of irrigation water and minimal processing on the microbial quality and safety of leafy green vegetables at formal (commercial farms) and informal (small-scale and homestead gardens) production systems. The prevalence of foodborne pathogens were also determined by using conventional

and novel molecular techniques, such as pyrosequencing and antibiotic and resistance gene detection. This study substantially contributed to food safety in South Africa as it provided an overview of microbial profiles and linking the safety status of irrigation water and leafy green vegetables in different production systems. Dr Jongman identified potential sources of microbial contamination on leafy green production systems and demonstrated that these environments act as reservoirs and carriers of clinically important human and opportunistic pathogens. Understanding the microbial quality of irrigation water and leafy greens may assist with the development of extended food safety programmes.

The GlobalGAP Summit fosters dialogue among community members globally. The biannual conference is the perfect setting to discuss the latest developments in food safety and sustainability as well as good agricultural and aquacultural practices and the future of the agricultural industry.

\*GAP stands for Good Agricultural Practice – and GlobalGAP is the worldwide standard that assures it.



Dr Gape Jongman



# Mathematical Statistics student selected as SAS Student Ambassador

An academic brilliant master's student in Mathematical Statistics, Ms Amelia van Schalkwyk was selected as one of the fifteen 2017 SAS Student Ambassadors.

This achievement earns her the opportunity to present at the 2017 SAS® Global Forum Conference in April 2017 in Orlando, FL at the SAS® Global Forum, where she will join over 5 000 SAS users from more than 35 countries for 3.5 days of intense learning and networking. Her presentation at the conference is titled *Behavioural spend modelling of cheque card data using SAS Text Miner*.

Amelia is currently studying part-time towards an MSc in the Department of Statistics after completing her honours in Mathematical Statistics cum laude in 2013.

In 2014 she started working as a Quantitative Analyst in the division Premium and Business Core Banking at FNB. Prior to this she was employed as an assistant lecturer in the Department of Statistics. Amelia also tutored calculus to first year students at UP as well as to matric learners from various schools.

The SAS Student Ambassador programme is a competitive programme designed to recognise students using SAS software to benefit their respective fields of study. SAS is the leader in analytics and innovative analytics, business intelligence and data management software and services.



Ms Amelia van Schalkwyk

# Best first-year lecturer in NAS awarded

A lecturer who inspires and motivates students ... This encompasses Mr Carel Oosthuizen, the first-year co-ordinator for Animal Diversity in the Department of Zoology and Entomology who received the Best First-year Lecturer Award in the Faculty of Natural and Agricultural Sciences (NAS) on 2 December 2016.

"I am humbled by the Award and grateful to all the students who participated in this new initiative. I have a strong passion for lecturing and research. My motto regarding lecturing, especially to first-year students, is that all students have the ability to pass, and most likely to do well in their courses. The second part of my motto is that first-year students have a strong desire to learn and to be diligent, but that most of them do not know that when they enter university. This is exactly where my responsibility as a first-year lecturer lies. I endeavour to instil a positive attitude towards studying by teaching the students to be informed and to foster a culture of good habits right from the start of their studies. The learning approach that I follow is strongly based on self-regulated learning, thereby acknowledging that a learner's behaviour, learning environment and student self-motivation strongly affect learner achievement and success. The reason why I am using this approach is to, as from the first year, create a culture of being an active learner who can manage his/her own learning by self-monitoring, self-motivation and strategy implementation."

Mr Oosthuizen said: "The approach used in my lecturing led to the exciting and successful implementation (as part of a team) of new teaching aids and technologies into the first-year classroom over the past five years. The biggest of these implementations were the successful use of clickers in the classroom. As part of the team, I received a certificate of Excellence for Teaching Excellence and Innovation at the University of Pretoria, for the lecturing approach followed in teaching Molecular and Cell Biology. I also implemented virtual classrooms, using Blackboard Collaborate, for immediate direct help with the course content, thereby maximising student communication and access to the lecturer. Part of implementing new technologies and strategies also include student feedback through surveys for informing and directing my current approaches and the development of new approaches. As part of my teaching approach, I believe that it is important to focus on the scientific method right from the start of a student's university career, with regular reference to my own research that is being conducted, as well as interesting relevant but extracurricular contemporary studies in the science literature," Mr Oosthuizen said.

He is currently enrolled for his PhD titled, *Genetic diversity and population structure of four marine fish species (Teleostei: Sparidae) along the Southern African coast, focussing on molecular phylogenetics, population genetics and conservation biology specifically in the aquatic environment*. "Fishes have for long been the main resource exploited from the aquatic environment and extraction has caused a number of undesirable results, such as overexploitation and the threat of extinction. I am interested in identifying the evolutionary processes

that have shaped the genetic diversity, its distribution and the patterns that can be observed today," Mr Oosthuizen concluded.

Mr Oosthuizen also received a floating trophy, branded by NATHouse, as well as a cash prize and a certificate from NATHouse.

This Award was initiated by the Faculty's student house, NATHouse, and specifically by the previous Chairperson, Alexis Schultz, to recognise the extra effort that the first-year lecturers put into their teaching and learning activities. According to Dr Quenton Kritzing, guardian of NATHouse, "their efforts are really appreciated by the students and this Award serves as an encouragement for the lecturers."

A great word of thanks to the 2016/2017 Chair, Ms Nosihle Msomi, as well as the Executive Committee members of NATHouse for their efforts with the arrangements (among others marketing, acquiring the nominations, the voting process) related to the Award.

The other nominees for the Award were: Mrs Bettie Basson (Statistics), Dr Kershney Naidoo (Genetics), Dr Harry Wiggins (Mathematics and Applied Mathematics), Dr Ruaan Kellerman (Mathematics and Applied Mathematics), Mr Nick de Beer (Chemistry) and Prof Walter Meyer (Physics).

Voting by all NAS undergraduate students took place between 31 October and 12 November this year and more than 20% of the registered first-years in the Faculty voted via ClickUP. This was really exceptional as the students had limited access to campus due to the protests.



Mr Carel Oosthuizen and Ms Nosihle Msomi (NATHouse Chairperson 2016/2017).



# MSc student won Best Oral Presentation Award at International Seed Ecology Conference

Ms Samantha Jamison, a master's student in the Department of Plant and Soil Sciences, recently won the prize for the Best Student Oral Presentation at the 2016 Seed Ecology Conference, organised by the Federal University of Minas Gerais in Brazil. She was one of only a few MSc students attending the conference – most of the attendees were PhD students, which makes her achievement all the more outstanding.

The title of her presentation was, *Is seed dispersal by avian frugivores a broad-scale determinant of bird-dispersed tree diversity?* Ms Jamison said: "We were given 12 minutes to present. My presentation focused on the first chapter of my MSc work that deals with how the diversity of frugivorous birds affects the species richness of bird-dispersed trees across southern Africa."

Ms Jamison's MSc, which is funded by the NRF and supervised by Dr Michelle Greve, focuses on how to elucidate the way in which biotic interactions between trees and birds drive ecological patterns at both local and broad spatial scales. "At present, most studies assessing the effect of global change on biodiversity focus exclusively on the consequences of changes in climate, often due

to a lack of understanding of how interactions between species and dispersal processes can influence these processes. My project aims to elucidate how both climatic factors and species interactions, specifically dispersal processes, between birds and trees drive ecological patterns at local to subcontinental scales," she explained.

The theme for this year's conference was *Seeds in the Web of Life*. There were six categories in which speakers could participate: Evolutionary seed ecology; Frugivory and seed dispersal (Ms Jamison presented her paper in this category); Seed banks; Seed germination and dormancy; Seed ecology applied to agriculture; and Seed ecology applied to biodiversity conservation and restoration

The Seed Ecology Conference deals with the science of seeds and the environment. The conference is organised by the International Society for Seed Science (ISSS). It is held biannually, and the next conference will be held in Germany in 2018.

---

For more information on the conference, visit  
<http://www.seedecologyv.com/>

---



Ms Samantha Jamison

# Ntombi wins prestigious DST Fellowship

Ntombi Gama, a PhD student at the University of Pretoria (UP) was recently awarded a prestigious fellowship from the Department of Science and Technology (DST) at the 2016 Women in Science Awards (WISA) ceremony. Her PhD studies focuses on HIV and opportunistic diseases such as Tuberculosis (TB) and cervical cancer.

The DST annually hosts this ceremony in order to reward excellent female scientists and researchers, and to encourage younger women to follow in their footsteps.

Ntombi completed a BSc, a BSc (Hons) and an MSc in Biochemistry in the Faculty of Natural and Agricultural Sciences at UP and is a member of the Golden Key International Honour Society. She furthermore holds membership of the Biochemical and the SA HIV Clinicians Society.

According to Ntombi, "it feels amazing to be recognised. But it is also a challenge because I still need to go out into the community to let young people know that there is science and that there are careers besides teaching, being a lawyer or a policeman. If a kid like me, who came from a township could go to varsity and be successful, then what is stopping you? The school you come from does not change anything. It is all about what you believe in."

She also elaborated by saying that "South Africa is still one of the highest HIV infected and affected countries in the world, with an estimated one in five South African women in their reproductive ages being HIV positive (Statistics South Africa, Mid-year population estimates, 2015). Although treatment is available, commonly called anti-retroviral therapy (ARV), these drugs are associated with some

unbearable side-effects and there is still large scale non-compliance by the patients with using the drugs. In addition to that, there is still the issue of the co-infection of patients with other diseases such as TB and cancers which are largely prevalent in our communities. These further complicate treatment strategies. Based on these, research is now moving towards the development of drugs that are less toxic and effective against HIV, as well as associated opportunistic diseases."

Click on the link <https://www.youtube.com/watch?v=2ajr0J-UP2k> for a glimpse of the event.

Acknowledgement: SABC



*Ntombi Gama*



# President's Award for Exceptional Achievement in Animal Sciences

Prof Hettie Schönfeldt from the Department of Animal and Wildlife Sciences was recently presented with the President's Award of the South African Association of Animal Science (SASAS) at the Annual SASAS Congress in Stellenbosch. The award is conferred annually upon a person who has made exceptional contributions to animal science and the livestock industries, the animal industry profession and the association.

Prof Schönfeldt is an Extraordinary Professor and project leader at the University of Pretoria and is also involved with the DST/NRF Centre of Excellence in Food Security.

At the same event, the Silver Medal for acknowledgement of an exceptional contribution to the advancement of professionalism and the knowledge in Animal Science and the Livestock industry was awarded to Prof Este van Marle-Köster.

Prof Van Marle-Köster has been involved in teaching and research for the past 21 years. Her research focuses on the application of DNA markers and genomics in the genetic improvement of livestock. She is the co-ordinator of the sub-committee for research in the Beef Genomic Programme, and acts as the co-ordinator for the Dairy Genomic Programme, funded by the Technology Innovation Agency (TIA). She has published widely in peer-reviewed journals and contributed to book chapters.



*Prof Este van Marle-Köster (Head of Department: Animal and Wildlife Sciences) and Prof Hettie Schönfeldt*



# Prof Koos Bothma honoured by SAWMA



Prof Koos Bothma

A former Director of the Centre for Wildlife Management and Emeritus Professor in the Department of Animal and Wildlife Sciences, Prof Koos Bothma was recently awarded the first Wildlife Excellence Award from the Southern African Wildlife Management Association (SAWMA). He received this honour "for significant contributions to the field of wildlife management and research in southern Africa".

He started his career at the University of Pretoria as the Eugene Marais Chair of Wildlife Management in the Department of Zoology in 1971. He progressed through the ranks to become Full Professor in 1981. He was also the Director of the Postgraduate Centre for Wildlife Management at UP from 1989 and he held that position until his retirement in 2005. During his academic career he supervised 52 MSc and 11 PhD students in Wildlife Management.

Among others, he was a Founder Member of the South African Wildlife Management Association and President in 1975. Furthermore, he was the President of the South African Biological Society in 1980 and a co-founder of the Endangered Wildlife Trust of South Africa and a member of the Scientific Advisory Board of the Trust.

Prof Bothma is also the editor and co-author of the recently published sixth edition of the book *Game ranch management* which was first published in 1989 in Afrikaans, titled *Wildplaasbestuur*.

He was also awarded a Laureate Award in 2002. This is the highest award an alumnus of the University of Pretoria or an outstanding achiever can receive from fellow alumni. This award has been presented to distinguished alumni since 1974.



# Food Science student won IUFoST graduate competition

Mr Victor Ntuli, a PhD student in the Department of Food Science at the University of Pretoria (UP) was recently a prize winner of the IUFoST's Food Safety Beyond Borders Graduate Scientific Paper Competition. The award was presented during the 18 th World Congress of Food Science and Technology and Expo of the International Union of Food Science and Technology (IUFoST), held in Dublin, Ireland.

Entries to the competition were from graduate students whose work involved issues relating to food safety, addressing a local/ indigenous food type within their home country and also having international implications. During the first phase of the competition, students were required to submit an abstract of their paper under the guidance of their study supervisor. Short-listed candidates had to submit a full-length paper (2 600 words), together with possible interventions on how to solve the problem at hand. Mr Ntuli's paper, titled *Potential public health risk associated with multidrug resistant shigatoxin producing E. coli (STEC) O157 and non-O157 from producer-distributor bulk milk*, with his supervisor, Prof Elna Buys, as co-author was selected as a winner of the competition.

A summary of the paper follows:

Safety of milk sold directly from producer to consumer in informal markets, which in many cases is consumed by the poor and vulnerable, has globally been identified as a public health priority. One key concern is the potential transfer of drug resistant pathogens to humans through the food chain. South Africa (SA) is one such country where the dairy industry is characterised by a growing number of producer-distributors selling either raw or pasteurised bulk milk to the consumer. This category of milk in SA is permitted

by regulation. A survey on the milk in SA (2013) by a registered non-profit organisation, the Dairy Standard Agency (DSA), revealed high levels, above stipulated limit, of *E. coli* in the milk. Recent studies have also highlighted microbiological inadequacy in the quality of producer-distributor bulk milk (PDBM) sold in South Africa. However, these studies did not characterise possible pathogens in the milk. This study was conducted in order to characterise *E. coli* from PDBM for prevalence and the distribution of virulence genes encoding for shigatoxin and haemolysis genes, serogroups, antibiotic resistance and extended-spectrum  $\beta$ -lactamases (ESBLs) producing capacity. We reported poor microbiological quality characterised by the occurrence of high microbial counts which may reduce shelf life and can be a reservoir of pathogenic bacteria that potentially pose public health risks in PDBM. The results obtained in the study revealed a diversity of *E. coli* seropathotypes (with different shigatoxin virulence factors and ESBLs producing capacity) known to be associated with human diarrheal diseases in PDBM. Isolation of *E. coli* serotypes carrying virulence genes that are known to cause human diseases and also had multiple resistance to antibiotics, can present a significant public health risk, especially to the vulnerable members of the community. This study highlights a potential risk posed on human health by consuming PDBM, contaminated by pathogenic *E. coli*. In an attempt to effectively manage the food safety risk associated with pathogenic *E. coli* in PDBM in SA, collaboration between academia, industries and local government has been initiated. This integration of science and policy promotes the translation of science into action, hence, encouraging food security in developing countries.

The research was funded by MilkSA.

Mr Victor Ntuli



# Prof Mike Wingfield to receive the John F.W. Herschel Medal

Prof Mike Wingfield, a renowned international researcher and leader in the field of forest health will receive the prestigious Royal Society of South Africa (RSSAf)'s John F.W. Herschel medal for 2017. The award including a medal and certificate will be presented at the Society's Annual Dinner and Awards Evening in 2017.

The Herschel medal is the highest honour that can be bestowed on a Fellow of the RSSAf and the adjudicators recognised Prof Wingfield's outstanding contributions in the field of forestry, specifically but not exclusively related to the health of trees. This is not only in the context of what he has contributed in South Africa while based at the Forestry and Agriculture Biotechnology Institute (FABI) at the University of Pretoria, but also internationally. The RSSAf also referred to the fact that Prof Wingfield is the President of the International Union of Forestry Research Organisations (IUFRO), described as "one of the oldest and largest Scientific Unions in the world, representing between 15 000 and 20 000 forestry researchers linked to approximately 650 member organisations in 120 countries".

Prof Wingfield is Professor and Founding Director of FABI and also an A1-rated National Research Foundation (NRF) researcher.

His work on the topic of tree health has been widely published in more than 600 research papers and five books. As an invited speaker he has made numerous highly acclaimed presentations globally.

When asked to comment on the news of this award, Prof Wingfield said "I am humbled and most honoured to be recognised in this way by one of the most important societies promoting Science in South Africa". He also said "to receive an award in the name of John Herschel is particularly gratifying. This from my perspective not related so much to his remarkable accomplishments as an astrophysicist but the fact that he knew one of my great heroes, Charles Darwin. He also had a great passion for plants of the fynbos which I share."

Prof Wingfield has been elected as a fellow of several scientific societies, including the Royal Society of South Africa, the Academy of Science for South Africa (ASSAf), and the Southern African Society for Plant Pathology and the American Phytopathological Society. He is one of the few honorary members of the Mycological Society of America.

The prestigious African Union (AU) Kwame Nkrumah Scientific Award in the Life and Earth Sciences category was bestowed on Prof Wingfield in Addis Ababa in 2013, and other accolades that he received include the Johanna Westerdijk Award, awarded by the Centraalbureau voor Schimmelcultures (CBS) (Fungal Biodiversity Centre, the Netherlands), and he holds honorary DSc degrees from the University of British (2012), and from the North Carolina State University( 2013). He was also recently awarded the Distinguished Leadership Award for International Scientists for 2016, by his alma mater, the University of Minnesota.



Prof Mike Wingfield



# "Shoki-Nwa" scoops up Best Presentation Award at International Competition

A ready-to-drink sorghum-cowpea beverage developed by four Food Science students, recently won them an international award. They received this award for the Best Presentation at the 18<sup>th</sup> International Union of Food Science and Technology (IUFoST) Food Science "Students Fighting Hunger" product development competition, held in Dublin, Ireland.

The team called "Shoki-Nwa", named after the ready-to-drink, on the go beverage, consists of four Food Science students, Olumide Adedara, Emmanuel Nekhudzhiga, Nanamhla Adonis and Tholoana Mokhele. The name of the product was coined from two words, "Shoki", a Nigerian Yoruba word for "quick" and "Nwa", a South African Sesotho word for "drink".

The competition encouraged undergraduate students to use their knowledge and skills to develop innovative food products to fight hunger. Students were challenged to develop affordable high-protein (containing low to no meat), high-fibre, low-sodium products, based on regional raw materials and technologies.

The students developed the sorghum-cowpea beverage as part of their product development module during their honours programme

in 2015. The product is targeted at school age children in South Africa, especially those from low-income families. The dynamic duo, Olumide and Emmanuel represented the team at the IUFoST Conference in Dublin where they presented it before a distinguished panel of judges, competing against eight other teams from Costa Rica, Singapore, the Netherlands and Stellenbosch University (South Africa).

Speaking about their achievement at the conference, Olumide said it was a wonderful learning experience, especially so, because this module which he regarded as just another module that had to be passed, was being used to change and impact lives in other parts of the world. Emmanuel added that sharing knowledge with other researchers further developed his understanding of Food Science and that he will use it in his postgraduate studies. Olumide, Emmanuel and Nanamhla are currently MSc Food Science students at UP, while Tholoana is working in the food industry. The team hopes that with appropriate support and interest, they can further improve the product to make it commercially available in different shops in South Africa.

Read more at [www.iufost2016.com](http://www.iufost2016.com).



From left: Olumide Adedara, Nanamhla Adonis and Emmanuel Nekhudzhiga. Absent: Tholoana Mokhele

## CGIS master's student stars at Geomatics Indaba



Zinhle Mashaba

A master's student, Zinhle Mashaba from the Centre for Geoinformation Science (CGIS) shined brightly at the recent Geomatics Indaba 2016 at Emperors Palace, Kempton Park.

The Geomatics Indaba 2016 consisted of two paper categories, namely general papers and peer-reviewed papers. The peer-reviewed papers are published in a special issue of the *South African Journal of Geomatics*. Zinhle Mashaba's paper, titled *Evaluating spectral indices for winter wheat health status monitoring in Bloemfontein using Landsat 8 data* was voted the best academic paper at the Indaba. Her research that she presented was funded by the Agricultural Research Council (ARC).

The Spectral indices derived from remotely sensed satellite images, indicates crop vigor early in the season. However, less research has been conducted on investigating which indices are best related to winter wheat health status in South Africa. The research, focused on identifying spectral indices, can be used for crop monitoring so that farmers can modify their irrigation programmes or applications of fertilisers, pesticides or herbicides to improve wheat growth at stressed areas. This particular application can help to ensure food security as wheat is a staple food for most South Africans. Additionally, farmers can save money on conducting manual field surveys because satellite images cover a large area.

Geomatics Indaba is Africa's leading, inclusive conference, exhibition and training event for the geomatics sector. This conference was attended by local and international experts, with strong support from industry, local universities and the government. Postgraduate students at CGIS constantly participate in this annual event to showcase their projects.

## Biochemistry PhD student wins ASTMH Travel Award

Shehu S Awandu, a PhD student in Biochemistry was recently selected to receive the highly competitive American Society of Tropical Medicine and Hygiene (ASTMH) 2016 Annual Meeting Travel Award.

During November he attended the ASTMH 65th Annual Meeting at the Atlanta Marriott Marquis, Atlanta, Georgia. The award which is partially supported in by the Bill & Melinda Gates Foundation provides a complimentary Annual Meeting registration, round-trip coach and airfare to Atlanta, five nights' hotel stay at the Atlanta Marriott Marquis and a cash stipend.

This is one of the ASTMH's premier awards which is both honorific and substantive. It facilitates the participation of chosen tropical medicine researchers and trainees from around the world in the Annual Meeting.

At the Annual Meeting Shehu will present his work, titled "Glucose 6 phosphate dehydrogenase (G6PD) deficiency phenotype and genotype distribution in point-of-care settings in Vhembe district, Limpopo Province, South Africa". He is supervised by Prof Lyn-Marie Birkholtz, SARChI Chair in Sustainable Malaria Control in the Department of Biochemistry. His PhD project, based in the Vhembe District is important in contributing towards South Africa's aim of malaria elimination by 2018.



Shehu S. Awandu at the Malaria Parasite Molecular Laboratory (M2PL) offices



# Statistician rewarded for excellent publishing record

Prof Mohammed Arashi, an Extraordinary Professor in the Department of Statistics, has recently been awarded the Behboodian Award for statisticians younger than 40 who have published outstanding papers. This award is made biannually by the Iranian Statistical Society (ISS).

Prof Arashi is from the School of Mathematical Sciences at the Shahrood University of Technology, Iran. The award was bestowed on him during the 13th Iranian Statistics Conference on 23 August this year. He was selected as the winner for the effective role in the development and progress of Statistics and publishing high quality papers. Prof Arashi also won this coveted award in 2012.

The Iranian Statistical Society, Inc. (ISS) was founded in 1991 with the objective to further the study, application and good practice of statistical theory and methods in all branches of learning and enterprise. Today, the ISS serves 1 500 members in Iran and overseas, including all academic members of Iranian Universities and research centres in the field of Statistics.



Prof Mohammed Arashi

# Young scientists won Einstein Language Competition



Anneke Schoeman

Two students from the Faculty of Natural and Agricultural Sciences recently walked away with prizes in the LitNet Akademies Einstein Competition. Anneke Schoeman, an Entomology honours student won the first prize of R10 000, while Theunis Smit, a doctoral student in Plant Production won the third prize of R2 000.

With this competition – the first of its kind in South Africa – the academic journal, *LitNet Akademies* challenged young researchers at universities to summarise their own research (for example a master's thesis) in 130 characters or less. The competition was aimed at postgraduate students (honours, master's or doctoral students), as well as emerging academics (postdoctoral fellows and lecturers) in the age group 18 to 35 of age.

Anneke Schoeman's entry made a clean sweep with a unanimous vote by all seven adjudicators.

The winning entry reads as follows: "Ek is die luistervink tydens miskruiers se chemiese geflikfloo en ontrafel só hoe hulle sedert die oerjare flankeer".

Anneke says that she is an enthusiastic entomologist who is interested in reconciling the fields of natural sciences and literature. Presently she participates in the Dung beetle Research Group



Dung beetles



at the University of Pretoria while pursuing her honours project on the speciation of dung beetles, based on their chemical ecology, while she is a part-time language student at Tukkies. She dreams of one day combining her knowledge of science and languages and to apply it to stimulate love for the wonders of nature among the general public.

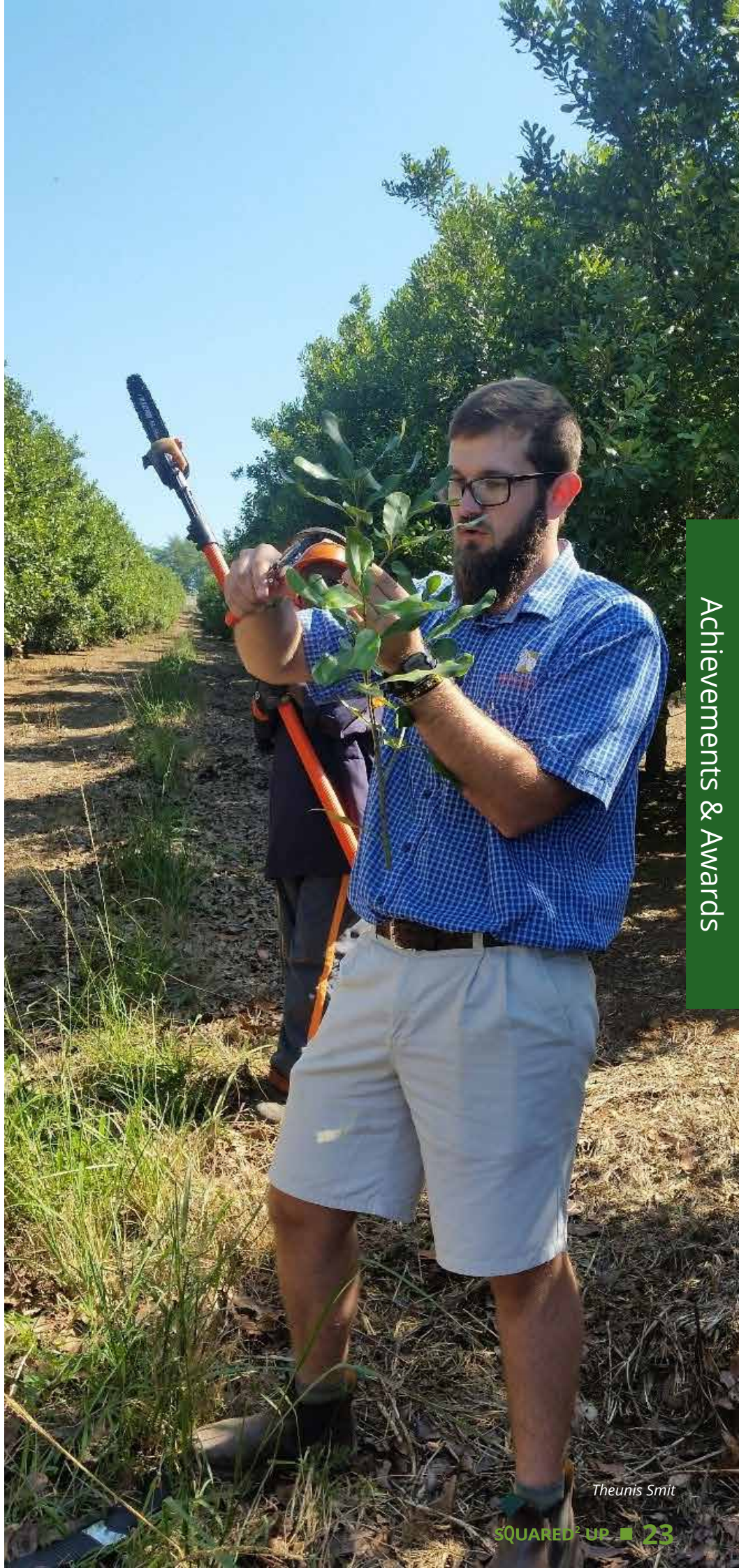
Theunis Smit is a doctoral student in Plant Production and his winning entry reads as follows: "Besproeiingskedulering: Boere is nat agter die ore wanneer dit kom by die nuutste tegnologie in waterbesparing."

Theunis is also a technical advisor for macadamia farmers in the Lowveld and in KwaZulu-Natal. It affords him the opportunity for pursuing research which really contributes to agriculture.

Regarding his research Theunis said that his present research project which focuses on the water consumption of macadamias is extremely interesting. What makes it so fascinating is the fact that this kind of research has never before been done on macadamias. For this reason every bit of information is worth sharing. As part of his research he equipped four macadamia trees with needles and thermometers. To be able to insert the equipment, he had to drill holes with a very thin drill bit. The needles and thermometers were inserted into the trees in order to obtain readings of the juice flow. He obtained very good readings, but one of the trees continually extruded all the needles and thermometers from its trunk. According to Theunis he views it metaphorically – one should always strive not to be like everybody else. He dreams to be recognised as a world renowned expert in the field of water consumption and preservation. Furthermore he would like to start his own business, such as a nursery or something similar.

*LitNet Akademies* publishes accredited academic material on an open access platform, and it encompasses five pillars, namely Human Sciences, Religious Sciences, Education, Natural Sciences and Law.

Acknowledgement: LitNet





# Dr Thulani Makhalanyane receives ISME award for service excellence

Dr Thulani Makhalanyane from the Centre for Microbial Ecology and Genomics (CMEG) at the University of Pretoria (UP) recently received the International Society for Microbial Ecology (ISME) award for service excellence. Through the action of ambassadors, the ISME and the field of microbial ecology have grown around the world.

Dr Makhalanyane is a lecturer in the Department of Genetics, Deputy Director at the CMEG and an avid researcher, focussing on the microbial ecology of extreme environments. He has been a member of the ISME for a number of years and has acted as member of the advisory board/session organiser for several of the Society's meetings.

*Dr Thulani Makhalanyane*





# Africa to host next International Symposium on Microbial Ecology

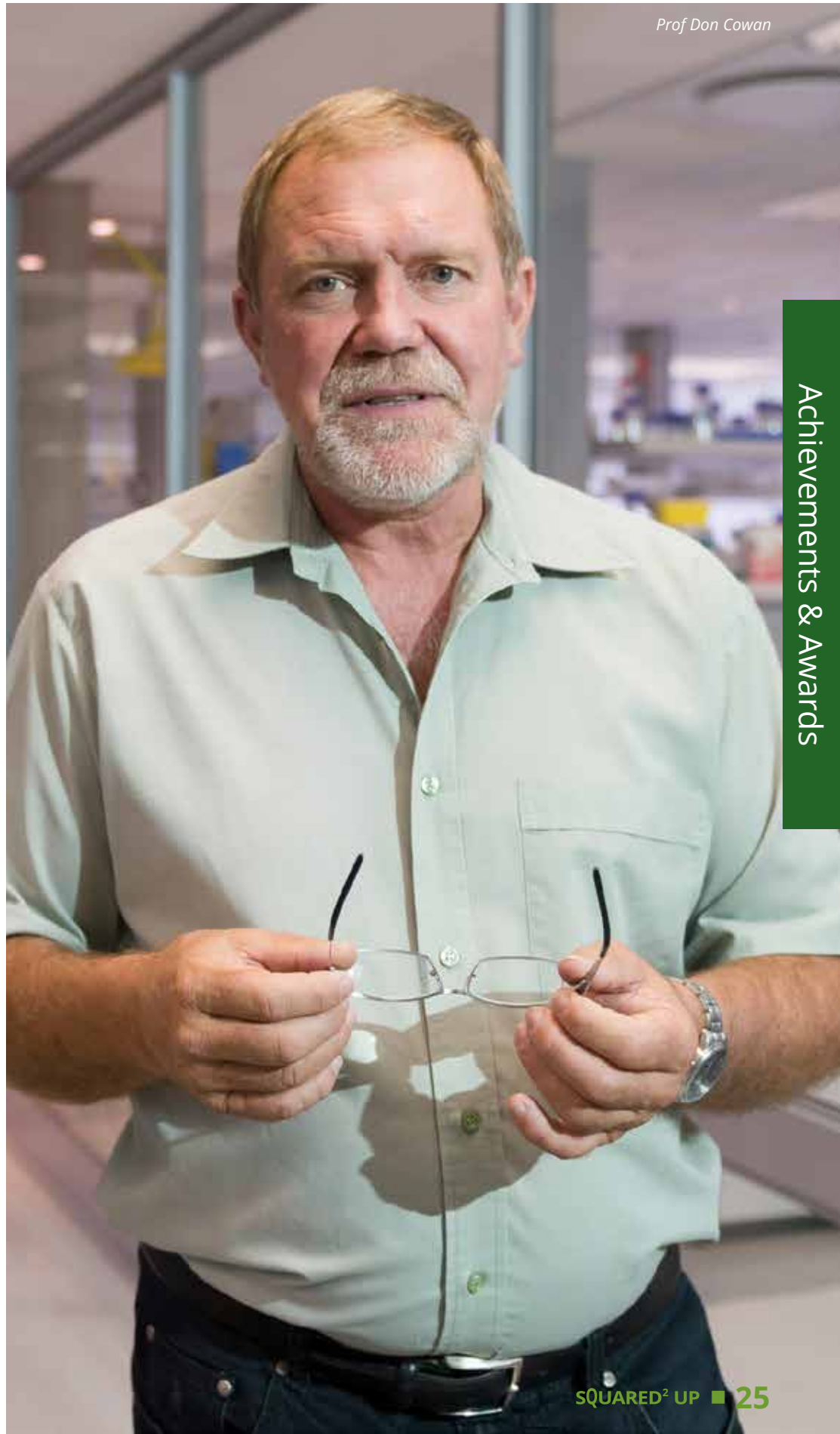
The University of Pretoria's Centre for Microbial Ecology and Genomics (CMEG) were successful in their bid to host the 18th International Symposium on Microbial Ecology (ISME) 2020. Other bidders were Hawaii, Auckland, Beijing and Santiago. The meeting will be held at the Cape Town International Convention Centre in August 2020.

The bid was prepared by the Cape Town Bid Local Organising Committee (LOC), which included researchers in the fields of microbiology from around the country, led by Prof Don Cowan and Dr Thulani Makhalanyane from the University of Pretoria.

Dr Thulani Makhalanyane, the LOC secretary stated: 'This will be the first ISME meeting on the African continent, and we are ecstatic! The success of the bid presents us with a unique opportunity to promote the field of Microbial Ecology across the African continent and we hope to attract more African delegates than before.'

The LOC Chairman, Prof Don Cowan, Director of CMEG, said: 'On behalf of the Local Organising Committee, I would like to state that we are extremely pleased that South Africa has been chosen as the venue for the 2020 International Symposium on Microbial Ecology (ISME-2020). Microbial ecology is an under-developed subject in Africa, but is vitally important in the growing appreciation of the value and importance of global and regional biodiversity. ISME-2020 will bring more than 2 500 international visitors to this continent, including all the world's leading researchers in the field, and this meeting will therefore represent a critical moment in the evolution of the fields of microbial ecology and biodiversity research in Africa.'

Prof Don Cowan



# Potatoes bring many honours to Carmen Muller



Carmen Muller

A PhD student in the Institute of Food, Nutrition and Well-being has been victorious at four different events over the past few months. The focus of Mrs Carmen Muller's research is on diverse qualities and textures of potatoes. Her supervisors are Prof Hettie Schönfeldt and Dr Nicolette Hall.

In June this year, Mrs Muller was one of 16 students chosen from various South African universities to attend the Annual Agbiz Conference and compete in the Student Case Competition in Somerset West. The nominations were based on their outstanding work in the agricultural sector. Mrs Muller was the only awardee from a nutritional background. The Case Competition is renowned for its high standard, and out of four teams Mrs Muller presented the winning case study on fynbos in the Western Cape.

Their winning team was awarded a trip on the Jewel of Transnet, the Blue Train, which took place at the end of October. This trip was covered by the media and will be featured as one of the highlights of the Student Case Competition.

After the success of the case study Mrs Muller was invited to represent UP at a Bathopele Leadership Summit in Bloemfontein, sponsored by John Deere. During this summit, students were evaluated for their specific leadership styles and were guided to ensure that they correctly implement their unique set of skills in their specific working environments.

To crown it all, Mrs Muller received the award for the best presentation delivered by a postgraduate student at the Annual Potatoes South Africa Research Symposium. Her presentation was titled, 'The reliability of dry matter, starch, specific gravity and glycaemic index to classify potatoes.'

Mrs Muller's research motto rings: Don't see the potato, see the potential.



# Poultry science essential to improve food security



*From left: Prof Jean Lubuma, Kelly Brannan and Dr Christine Jansen van Rensburg at the official opening.*

## *Is the humble chicken the solution to sustainable food security in Africa?*

This was one of the fundamental questions posed at the recent official opening of the Poultry Nutrition and Management Research Facility on the University's Experimental Farm. This facility was upgraded to the amount of R2 million, with a major part of the cost being covered through collaboration with generous sponsors from the poultry industry.

Dr Christine Jansen van Rensburg, Head of the Research Facility, said: "Through this Research Facility we will re-organise poultry research to align with the University's vision and support poultry production in Africa as being the solution to improve protein nutrition and food security in Africa."

"We are also forging strategic collaborations with key international poultry science research centres and will maintain close relations with the South African poultry industry. We strive for excellence in incubation, nutrition, and broiler management research. Furthermore, by developing knowledge and new talent in poultry science we strive to contribute to the future success of our industry," Dr Jansen van Rensburg said.

The Dean of the Faculty of Natural and Agricultural Sciences, Prof Jean Lubuma, also emphasised how this facility will assist in positioning the Faculty of Natural and Agricultural Sciences as a leading research intensive faculty in Africa. He also highlighted the importance of the University's partnerships with industry in helping to advance

scientific research while being beneficial to both academic and commercial interests.

Some of the research objectives of the incubation research unit facility include studying the effects of incubation temperature on embryonic development and subsequent broiler performance, providing chicks for broiler research trials, and to breed 'challenged chicks' in terms of gut development, physiological maturity, and susceptibility to metabolic diseases, often seen in commercial settings. From there, further studies would be conducted to examine the nutritional and management strategies needed to successfully rear the 'challenged chicks' in order to improve chicken health and performance.

The broiler section of the Poultry Nutrition and Management Research Facility will focus on determining digestible nutrient content of local feed ingredients. It will optimise feed recommendations for peak broiler performance and economic return under South African conditions. This will improve chicken health by reducing metabolic related mortality and leg culls, as well as investigate various feed additives and antibiotic replacement strategies (enzymes, probiotics, organic acids) to maximise chicken performance.

Overall, the renovations at the Poultry Nutrition and Management Research Facility promises to conduct new, cutting edge research in line with the University's vision, while also providing solutions for the future of food security in Africa.

# Sappi and Mondi sponsor bursaries in Forest Genetics and Biotechnology

The Forest Molecular Genetics (FMG) Research Programme, affiliated with the Department of Genetics and the Forestry and Agriculture Biotechnology Institute (FABI) has initiated an undergraduate bursary programme in tree genetics and biotechnology in collaboration with Mondi and Sappi.

This programme aims to provide students from previously disadvantage backgrounds an opportunity to work in FMG research laboratories under the mentorship of postgraduate students and staff, to gain exposure to research in the forestry industry, and to obtain financial contribution towards their undergraduate studies. Three first-year undergraduate students, Mr Tebogo Molemela, Ms Lethabo Lefoka and Ms Medha Sood will be the first recipients of these bursaries for 2016 to 2019. The aim is to expand the bursary programme to include additional forestry companies and to eventually support successful candidates throughout their postgraduate studies and offer them employment in partnering forestry companies.



*Ms Lethabo Lefoka*



*Ms Medha Sood*



*Mr Tebogo Molemela*



# Two young biochemists attend International Conference on Polyamines

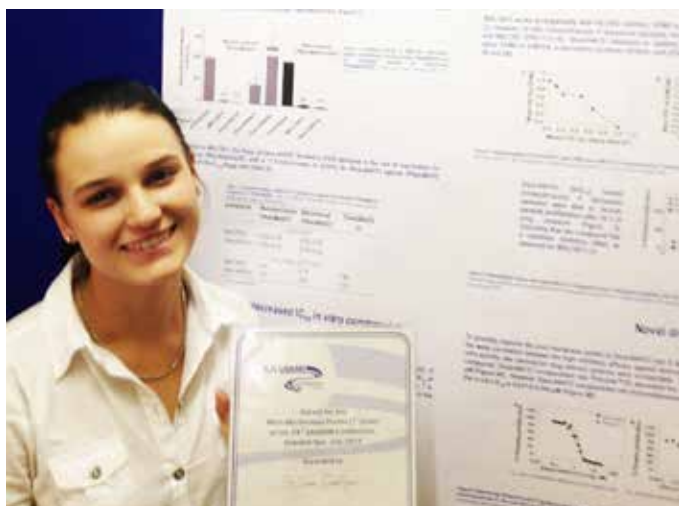


During September two postdoctoral fellows in the Department of Biochemistry, Dr Dina Coertzen and Dr Bianca Verlinden were invited to present their research at the 4th International Conference on Polyamines: Biochemical, Physiological and Clinical perspectives in Tivoli, Italy. They work under the supervision of Prof Lyn-Marie Birkholtz, the chairperson of the UP Institute for Sustainable Malaria Control (UP-ISMC).

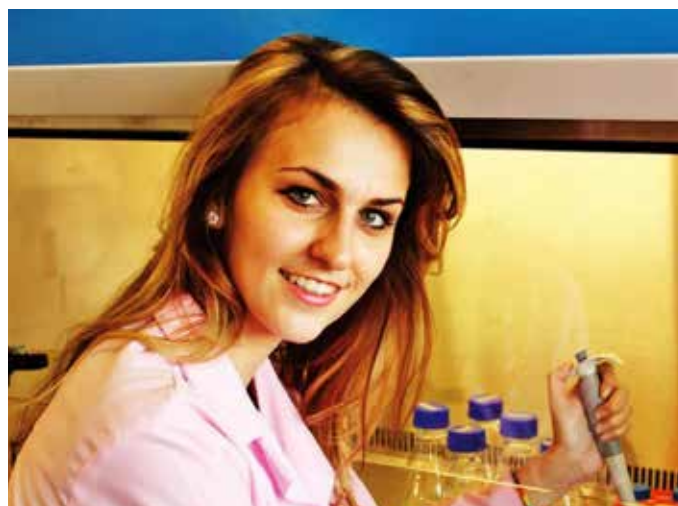
Dr Coertzen and Dr Verlinden were awarded bursaries from the International Centre for Genetic Engineering and Biotechnology (ICGEB) to attend this conference. The ICGEB is an international non-profit organisation that provides training and funding programmes to promote innovative research, especially in developing countries. The bursary covered their conference registration, accommodation and travel expenses.

The meeting was organised by Prof Enzo Agostinelli from La Sapienza University in Rome, and Prof Kazuei Igarashi from Chiba University in Japan and was attended by several eminent scientists from the USA, Israel, Japan and the UK, to name only a few. All the scientists were from different research fields, such as cancer, skin cell rejuvenation, plant growth and development and parasitic diseases, indicating the essential role that polyamines play in cell boost in a wide variety of potential industrial and therapeutic applications.

This conference provided them with the opportunity to orally present their novel research, exploiting polyamine biosynthesis as drug target in the malaria parasite, *Plasmodium falciparum*. They received excellent feedback and inputs for their work from established international collaborators at the meeting.



Dr Dina Coertzen



Dr Bianca Verlinden

# Biotechnology master's student invited on international research visit

Ms Hilde von Grüning, an MSc Biotechnology student at the University of Pretoria (UP) recently had the opportunity to pay a three month research visit Cambridge (United Kingdom), hosted by the Wellcome Trust Sanger Institute.

During her visit she was trained in various advanced experimental genetic approaches to studying gene regulation and control in the highly complex human malaria parasite, *Plasmodium falciparum*.

"I learned a great deal by independently finding innovative ways to problem-solving, based on pure biochemical principles. The environment at the Wellcome Trust Sanger Institute was incredibly intellectually stimulating, from the formal talks presented by the frontiers of malaria research, to the sharing of ideas and passionate discussions with fellow researchers," Ms Von Grüning said.

As part of her MSc research project and collaboration between the Laboratory of Prof Lyn-Marie Birkholtz (Department of Biochemistry, UP) and Dr Marcus Lee (Lee Group, Sanger), Ms Von Grüning is applying the renowned CRISPR-system to study the functional roles of putative cell cycle regulators in the malaria parasite. Hilde was also awarded the Merck prize for the best honours Biochemistry student in 2015. This award is given to the student with the highest final mark above 75% for their research project.

"In addition, being part of a diverse team of internationally scientists made me realise the importance of collaboration, exposure to cutting-edge scientific techniques and facilities, and most importantly, transferring the knowledge I gained back into our institution. I am grateful towards UP, the M<sup>2</sup>PL team and the Wellcome Trust Sanger Institute for providing me with their support, resources and time to make this collaboration successful. By granting me this remarkable opportunity, I was able to advance in my scientific career and to achieve goals far greater than I imagined," she concluded.

Malaria remains the most devastating of all parasitic infectious diseases, and this is particularly true in economically constrained countries on the African continent and South East Asia. The disease in humans is caused by infection of parasites from the genus *Plasmodium*, transferred to humans from *Anopheles* mosquitoes.

Her research visit was funded by the Faculty of Natural and Agricultural Sciences' Study Abroad Bursary Programme.



Ms Hilde von Grüning



# Seite Makgai helps other on her own road to success

Not only was Ms Seite Makgai employed as one of the first seven nGAP (New Generation of Academics Programme) lecturers in 2015 at the University of Pretoria, but she was also one of two winners of the prestigious Statistics South Africa (StatsSA) postgraduate paper competition in 2015.

In 2016 she continued on her journey to success by helping others. Ms Makgai was involved in one of the UP with Science's 2016 projects as a project leader. These projects are aimed at enriching Grade 11 learners across the Gauteng Province with mathematical and scientific knowledge. This project focused on making learners aware of the uses and challenges of statistics, as well as how to make sense of numerical values in statistics. The project won the 2016 Eskom Gauteng Regional Expo and also received a certificate for the best Mathematics project at the Expo.

She is a passionate lecturer who cares deeply for the well-being of her students and those around her. It is important to her that students see the bigger picture and that they learn to truly appreciate the subject field. She also started her own initiative to motivate learners in township schools. "My wish is to have a country with people who can understand, analyse and create new knowledge which can help to solve social problems," she says.

Ms Seite Makgai graduated in September 2015 with an MSc in Mathematical Statistics and is currently working towards a PhD in the same field. She is involved in extreme value statistics and distribution theory. Her PhD thesis is based on developing new distributions that will be flexible enough to model multivariate extreme value datasets. "The application part of my research is very exciting, since I believe that the application is where the true power of the research is the easiest to appreciate. Prof Daan de Waal from the University of the Free State (one of my supervisors) has just visited Pretoria and has left me with exciting new parameter estimation techniques to explore."

The nGAP (New Generation of Academics Programme) is a developmental programme by the Department of Higher Education.



Ms Seite Makgai



# UP Synthetic Biology team wins silver medal at prestigious international competition



What do seven biologists, three engineers and a multimedia student all have in common? A passion for transdisciplinary research and excellence in scientific innovation.

This eclectic group of students comprise the 2016 Pretoria\_UP iGEM (international Genetically Engineered Machine) undergraduate team that developed unique synthetic biology and hardware modifications for more efficient electricity generation in plant materials-derived photo-bioelectrochemical cells. Their project, dubbed “WattsAptamer”, explored the attachment of plant photosynthetic machinery to graphene electrodes, using custom DNA-based linkers, known as aptamers, in order to enhance the efficiency of electron harvesting from photosynthesis for electricity generation.

Among other achievements, the team also developed a novel, open-source, 3D-printed photo-bioelectrochemical cell prototype that was shown to generate electricity in the presence of light. The team, which was hosted in the Forest Molecular Genetics (FMG) Programme, Department of Genetics and Forestry and Agricultural Biotechnology Institute (FABI), was mentored by their instructor Dr

Steven Hussey and additionally advised by Prof Zander Myburg and Dr Eshchar Mizrachi (FMG) as well as Prof Ncholu Manyala, Dr Tjaart Krüger and Dr Michal Gwizdala from the Department of Physics. In October 2016, the team presented their project at the iGEM Giant Jamboree in Boston, as one of over 300 teams from across the world and only two from Africa.

They fulfilled the criteria for a silver medal for their project at the competition, which they documented in an extensive wiki, poster and oral presentation. The project also included an extensive human practices portfolio focused on engagement with the energy sector in South Africa, community outreach and education, local synthetic biology competency development and international collaboration. Sappi Southern Africa was the official team sponsor, with additional support from the University of Pretoria, the Department of Science and Technology, Inqaba Biotec, the National Science and Technology Forum, Whitehead Scientific, Integrated DNA Technologies and the African Centre for Gene Technologies.

Read more about the team’s project on their online wiki: [http://2016.igem.org/Team:Pretoria\\_UP](http://2016.igem.org/Team:Pretoria_UP)



*The Pretoria\_UP iGEM team*



# Meteorology student selected to attend International Summer School

Jean du Preez, a Meteorology honours student in the Department of Geography, Meteorology and Geoinformatics was selected to attend the Maïdo Observatory Summer School (MOSS) in Reunion from 28 November to 3 December 2016.

"Attending the Summer School was a privilege and a fantastic experience. Being an honours student, I was able to learn from the experience and knowledge of postgraduate doctoral students interested in a similar field of study. These students are keen to help and are interested in the research that I have performed. The MOSS also affords the opportunity for collaboration as well as the possibility for an international master's degree. Furthermore, the lectures combined knowledge from the different modules that were done in the undergraduate and honours degrees. This was also a unique opportunity to see how the instruments at the Maïdo Observatory are used as many of these instruments are not used in South Africa," Mr Du Preez said.

Mr Du Preez obtained his BSc Meteorology degree in 2015 from UP and continued with his honours degree in 2016. In his honours research he investigated the anti-correlation between Ozone and Ultraviolet radiation over Cape Point and a possible association with Antarctic ozone hole events.

He went through a selection process and was fully funded by the

Programme. Dr Caradee Wright (from the Medical Research Council, an extraordinary UP staff member and Mr Du Preez 's project supervisor) was also in attendance to give an expert lecture.

The MOSS aims to focus on troposphere-stratosphere composition and dynamics. It took place on Reunion Island, a southern tropical site (21.0° South, 55.5° East), where atmospheric observations and research activities have been developing since the early 1990's.

The MOSS is intended to focus on monitoring and understanding processes and changes in the Earth's atmosphere (troposphere and stratosphere), with emphasis on dynamics, long-term evolution of atmospheric composition and climate change.

The Summer School academic activities are based on courses and training in accordance with SPARC (Stratosphere-troposphere Processes And their Role in Climate) activities and with its strategy in terms of capacity development. SPARC is a core project of the World Climate Research Programme (WCRP). A stringent selection process of postgraduate doctoral students from Southern Africa and Indian Ocean countries was done to select a group of about 40 students for the MOSS programme. Students are fully funded during their attendance of the Summer School. Lecturers come from around the world and lecture on topics in which they have world renowned expertise.



Jean du Preez

# PhD student in Agricultural Economics won award for paper at AEASA

Ms Melissa van der Merwe, a PhD student in the Department of Agricultural Economics, Rural Development and Extension and her supervisor, Prof Jacques Trienekens (Wageningen University) had their contributed \*paper upgraded to a plenary paper and received the second prize for the best upgraded paper at the recent Agricultural Economics Association of South Africa (AEASA) Conference.

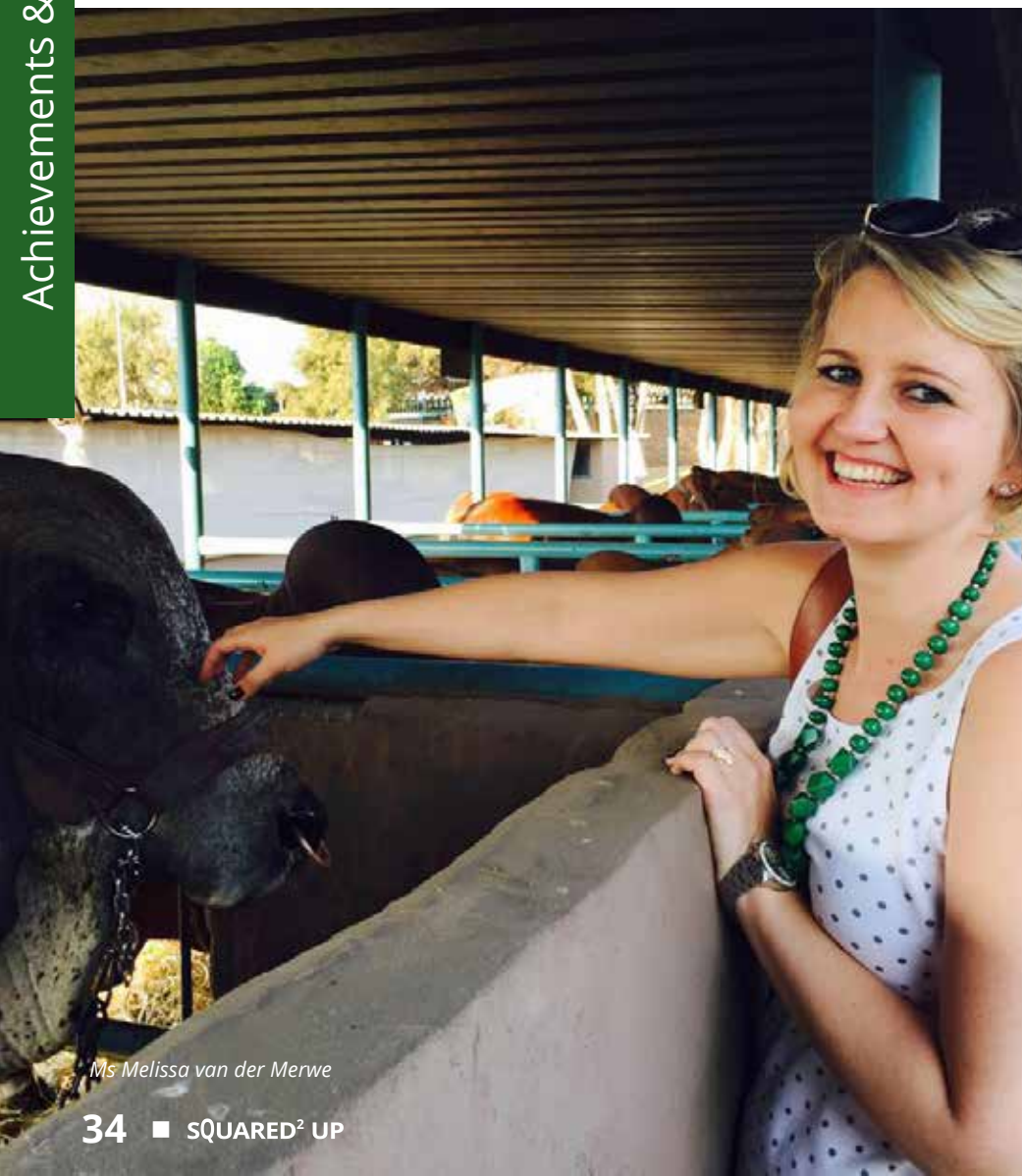
According to Ms Van der Merwe, “recent meat scandals, both in Europe (horse meat scandal) and in South Africa (donkey and water buffalo scandal), as well as news headlines such as ‘What’s really on your plate?’ makes consumers doubt the true origin of the meat we are consuming.”

In the award winning paper, was stated: “The differentiation of supply chains, by adding claims such as ‘free range’ or from a specific ‘region of origin’, ultimately increases the probability of opportunistic behaviour. One illustrative case study of such differentiation of a commodity-based supply chain is Karoo Lamb in South Africa. The Karoo Lamb supply chain is different in that it identifies and guarantees the Karoo region as the origin of the lamb product which gives the lamb a unique ‘spiced on the hoof’ flavour. The unique identity of, and the geographical value attached to Karoo Lamb made the product exceptionally vulnerable to opportunistic behaviour by farmers who do not comply with the strict production protocols. This non-compliance suggests a possible principal-agent problem between farmers (agents) and abattoirs (principals). It is in this context that the study identifies measures that can safeguard the transaction against

opportunistic behaviour by agents to protect vulnerable consumers against exploitation and to increase the overall success of the Karoo Lamb supply chain. This is achieved by exploring the relationship between the certified Karoo Lamb farmer and the certified abattoir, to determine the factors that impact on a farmer’s tendency to behave opportunistically, and secondly, to recommend strategies to eradicate the opportunistic behaviour, especially in differentiated meat supply chains.”

Ms Van der Merwe enrolled for her master’s degree at the University of Pretoria in 2010 and received a scholarship from the SKILL Program to study at the Wageningen University and Research Centre in the Netherlands. Here she expanded her horizons to Supply Chain Management (at that stage taught by Prof Jacques Trienekens) which was also the basis of her master’s thesis, titled *Evaluating traceability systems within the South African sheep meat supply chain* and which was supervised by Prof Johann Kirsten. In 2012, a paper based on the master’s thesis was published in *Agrekon* and in 2013 she presented this paper at the International Conference of Meat Science and Technology in Izmir, where the paper won the prize for the best presentation. In 2014 she enrolled for a PhD in Agricultural Economics, with a more specific focus on institutional arrangements in agricultural supply chains. The title of her PhD study is *Asymmetric information, principal-agent behaviour and governance mechanisms in the South African lamb supply chain*, supervised by Prof Kirsten and Prof Trienekens. Currently, three papers based on her PhD research are under review for publication in international journals. Her research is funded by the Red Meat Research and Development Trust of South Africa.

\*The catalytic effect of farmer networks on (honest) information sharing to inhibit the opportunistic behaviour of farmers. Van der Merwe, M. and Trienekens, J.H.



Ms Melissa van der Merwe



# Publication award for Dr Frikkie Liebenberg



Dr Frikkie Liebenberg

Dr Frikkie Liebenberg, Senior Lecturer in the Department of Agricultural Economics, Rural Development and Extension recently received the SJJ de Swardt award for the Second Best article published in the *\*Agrekon* during 2015. This award was made at the annual Conference of the Agricultural Economics Association of South Africa (AEASA).

The *\*article* flowed from Dr Liebenberg's research into long-run trends in productivity in the South African agricultural sector and the influence that science and technology policy in particular has had on the productivity.

"This research programme forms part of a broader focus on trends in agricultural productivity in Africa conducted in collaboration with the InSTePP Center of Minnesota University. I have been a Research Fellow at this centre since 2007. An earlier article of mine analysing the long-run trends in public sector investment in agricultural research and development since 1910 has won the first place in 2011. We are currently working on revising the long run trends in agricultural employment, shifting patterns in maize production and correcting the estimates of agricultural investment in machinery and equipment and the development of geospatially disaggregated set of productivity accounts for South African agriculture," Dr Liebenberg concluded.

*Agrekon* is a quarterly publication of the Agricultural Economics Association of South Africa (AEASA).

\*Liebenberg, F, Kirsten, J., and P. Pardey, P. (2015) South African Agricultural Production Value and Quantity Indexes: 1910-2010. *Agrekon*. Vol. 54(4): 1-27.

# Shedding light on animal responses to changing environments



Climate change in Southern Africa will have far-reaching effects on the activities and well-being of humans. Predicted higher average temperatures, lower average rainfall, higher variability in weather, and more heatwaves and flooding will have dramatic consequences for water supply, food production, the generation and transmission of electricity, and human health. As a result, research is being done on technological advances in order to enable humans to adapt to the changing climate.

But spare a thought for our wildlife.

Most of us are aware of the shrinking habitat of the polar bear. However, rising temperatures also affect less charismatic animals. Small mammals are faced with the challenge of regulating their body temperature. If they cannot succeed in doing so, they suffer thermal stress and behavioural changes. In one case, increased temperatures lead to a rise in sea levels, which affected the availability of food and eventually resulted in the extinction of a small mammal species. Furthermore, extended heatwaves and droughts lead to the catastrophic die-off of desert birds because of insufficient access to water.

Research on the ability of small animals to adapt to changing environmental conditions will be fostered by means of the new Small Animal Physiological Research Facility at the University of Pretoria (UP). This state-of-the-art facility consists of ten environmentally controlled rooms in which the temperature, humidity and light cycle can be manipulated. In addition, it houses the entire additional infrastructure required for modern, humane research on small animals.



*The new Small Animal Physiological Research Facility*

The temperature, humidity and lighting in the rooms are fully programmable and controlled by means of custom-written software. In five of the rooms any temperature between zero and 50 degrees Celsius can be maintained and these rooms will be used primarily for projects on the thermal acclimation in birds. The remaining five rooms are designed for chrono biological research on mole rats and other small mammals, led by NRF A-rated researcher Prof Nigel Bennett.

According to Prof Andrew McKechnie, Head of the Department of Zoology and Entomology at UP, the first projects in the Small Animal Physiological Research Facility are due to start soon. His research on the effects of climate change on water loss rates in desert birds is internationally recognised and will benefit greatly from the new facility.

"I am really excited by the prospect of being able to untangle the effects of local genetic adaptation and acclimatisation – the intrinsic flexibility of individuals – on the ability of birds to tolerate high temperatures and dry conditions."

Researchers from UP and other institutions who are interested in collaborating with Prof Bennett or Prof McKechnie and in utilising the Small Animal Physiological Research Facility are encouraged to make contact.



# African Soil Microbiology project launched

Climate change and ever-increasing populations have contributed to make Africa the continent that faces the largest challenges with regard to soil conservation and food security.

During the second week of October this year scientists from seven sub-Saharan African countries met at the University of Pretoria (UP) to launch the African Soil Microbiology Project. Prof Don Cowan, Director

of the Centre for Microbial Ecology and Genomics (CMEG) is the project leader. This three-year project, which will be funded by USAID, aims to undertake a broad-scale survey of soil microbiology across the entire African continent, using the latest next-generation DNA sequencing and computational technologies.

This unique multinational project, the first ever study of this nature to be undertaken in Africa at this scale, is expected to unravel the complexities of soil microbiological diversity across sub-Saharan Africa. The results of the research will contribute to our understanding of soil fertility, soil degradation, the future impact of climate change and important health issues, such as soil-borne pathogens.

For more information, contact the project leader, Prof Don Cowan at [don.cowan@up.ac.za](mailto:don.cowan@up.ac.za)



*The African Soil Microbiology project team in the CMEG laboratories at UP*

## Science Leadership Programme to expand across Africa

The Africa Science Leadership Programme (ASLP) recently launched the first Science Leadership Programme (SLP) clinic. The SLP clinic aims to give momentum to the process of expanding the ASLP to other parts of Africa. Thirteen ASLP fellows from 11 institutions and seven countries participated in the two day workshop at UP. The intention of the clinic is to empower fellows to run satellite workshops at their institutions or regions in order to increase the reach of such leadership programmes; the current ASLP only reaches 20 researchers a year.

The satellite programmes will run independently of the ASLP and with their own objectives. The ASLP will, however, support these programmes by sharing the experience of the development of the continent-wide programme, as well as sharing the material developed via ASLP.

The clinic covered the following elements and shared it with the ASLP fellows: exposure to skills needed for facilitative leadership; sharing details of the practical aspects of the programme; sharing key materials and exploring how to use it; and the development of a system that will help keep these satellite programmes connected.

The first institutional (UP, South Africa) model replicate of the ASLP, known as the Tuks Young Research Leader Programme (TYRLP), was launched in 2015 and has recently held a second round of clinics. There are 42 fellows who are a part of the TYRLP from the 2015 and 2016 group. The most recent development of the TYRLP is the initiation of a process to establish a Tuks Young Researcher Forum that aims to further strengthen the community amongst UP young research leaders.

The ASLP was launched in 2015 and is in partnership with the University of Pretoria, the Global Young Academy (GYA), Knowinnovation (KI) and the Robert Bosch Stiftung.



# Creating an innovative perspective on research leadership at UP

During October this year, the second round of the Tuks Young Research Leader Programme (TYRLP) was held at the University of Pretoria (UP), involving 20 new fellows from seven faculties. The inaugural round of this programme was launched in November 2015 and formed a strong foundation for future rounds. The TYRLP is an initiative of UP, in partnership with the Africa Science Leadership Programme (ASLP), Knowinnovation (KI) and the Robert Bosch Stiftung.

The programme was developed and proposed in response to the increasingly complex challenges facing the world, with focus on Africa. The fellows are all emerging academic leaders and are considered potential 'game changers' at UP. The programme serves early career researchers in basic and applied science, engineering, social sciences, arts and the humanities, using a highly interactive approach to training, peer support, mentorship and application of skills to leadership projects.

Prof Stella Nkomo and Prof Tinyiko Maluleke joined the workshop as provocateurs and shared their insight on the development of a scholarly voice and the habits of good leadership. Mentors who supported fellows through the sessions were present throughout the workshop and included Dr Eshchar Mizrahi, Dr Cori Wielenga, Prof Bernard Slippers, Dr Eva Alisic and Dr Rees Kassen. Following this engagement, the ASLP team will support the fellows for the next year by sharing resources, tools and opportunities complementary to the techniques introduced during the workshop.

The programme will continue to develop a community of like-minded young researchers within the University. These researchers can contribute to leading UP to become a research intensive institution, in line with the projected UP 2025 vision. Additionally, a Tuks Young Research Leadership Forum is being developed to further strengthen the community amongst fellows and other researchers.



*Participants in the second round of the Tuks Young Research Leader Programme*



# Future Africa holds scoping meeting for its first Ideas Lab at UP

The first Ideas Lab scoping meeting was held at the University of Pretoria (UP) in October this year, focusing on African Biodiversity and Sustainable Development.

The meeting included 24 participants from three institutions, with representatives from seven UP faculties. They endeavoured to get a broad perspective on the topic. The objectives of this meeting were to formalise the central 'challenge' around which the Ideas Lab will be developed and to identify how the expertise across the University can be linked to this theme. In 2017 Future Africa will host the Ideas Lab which will expand on ideas developed during the scoping meeting.

The Ideas Lab workshops will be a core part of the Future Africa initiative's aim to develop interdisciplinary research teams and networks between UP researchers and researchers in Africa and beyond. Ideas Lab workshops will be five-day events which will be extremely intensive, interactive and demanding, involving 20 to 30 researchers from different disciplines or representatives from other sectors. Over the course of the events, participants will work together to deepen their shared understanding of the identified challenge in order to redefine the problems within it and formulate innovative ideas for research proposals. Each workshop will produce an interdisciplinary research project that is risky, cutting-edge and unlikely to emerge naturally. Future Africa is partnering with Knowinnovation (KI), which has extensive experience facilitating Ideas Labs for major funders and universities around the world.

The broad theme of this particular planned Ideas Lab is 'African biodiversity and sustainable development'. Biodiversity is one of the most central and intersecting themes among the 17 UN Sustainable

Development Goals, affecting all the others, both directly and indirectly. Failure to engage with these intersections is arguably one of the main reasons why global pressure on biodiversity has continued to increase over past decades, despite exponential growth in knowledge about the subject.

The African continent has a wealth of natural resources, including eight of the world's biodiversity hotspots. While Africa is best known for its mammal diversity (25% of the world's species), it also harbours similar wealth in plant and microbial diversity, spread over vast, diverse and often extreme environments. This diversity is the lifeblood that African societies have depended on for centuries. Sadly, much of it is hardly known or mapped, making it virtually impossible to protect before it degrades beyond recovery or disappears altogether, let alone being explored for development.

While biodiversity faces serious threats, alleviation of poverty and equitable development remain Africa's biggest and most urgent challenges. A critical future focus for Africa is therefore to reconcile its societal development needs with a uniquely African 'green revolution' that would aim at achieving wise use and protection of its ecosystems and bio-resources, while transforming its agriculture, fishery and forestry management.

Without cross-sectoral integration, biodiversity will remain a side-line issue in regional development policies, and extremely vulnerable. Addressing this challenge is the focus of the bio-resource economy (or bio-economy) strategy of the South African Department of Science and Technology (DST) and the African Union, and it is these burning questions that the 2017 Ideas Lab workshop will address.



# A Smart 'switch' in Photosynthesis holds lessons for Solar Technology



Photos: Monsoon Photography

Photosynthetic organisms like plants are the ultimate natural solar panels. They are extremely efficient at converting sunlight into stored energy. Researchers working on "bio-inspired" solar innovations – drawing from the natural world to create new technologies – find this extremely interesting.

They are keen to understand exactly how the photosynthetic machinery works to harvest light under different conditions, such as cloudiness or rapidly changing shade conditions. Once they have figured out the process, scientists will be better able to mimic nature's clever solutions for cleaner energy production.

It is remarkable to think that the amount of energy from the sun which, in one hour, falls on the earth, can power all human activity for an entire year. Therefore it is clear that solar energy – a free resource – is a very attractive option for everyday use.

There remains a great deal to learn from natural photosynthesis, a complex process during which solar energy is stored in energy-rich molecular compounds. This is the most compact form of energy storage.

With colleagues from France, the Netherlands and Japan we have recently published research that takes our understanding of light harvesting a step further.

We wanted to discover how photosynthetic organisms such as plants and cyanobacteria cope with rapidly fluctuating sunlight intensities. We studied individual light-harvesting protein complexes and discovered that they have a remarkable ability. Light, which is

normally effectively harvested, is also used by these photosynthetic "nano- antennae" to finely control how much of it should be harvested.

This mechanism is immediately switched on when the light intensity suddenly increases. It serves to protect the photosynthetic machinery – and ultimately the whole organism – from damage before other proteins or mechanisms come to the rescue

Our discovery is extremely exciting and has important implications. It points to one remarkable "design feature" of these natural light-harvesting units: that they are self-regulating systems. And, very surprisingly, this self-regulation is done by using only light, which is the cheapest way of performing this task.

No energy or time has to be invested by the system to get accessory molecules or proteins to perform the job of regulation. Thus, one could imagine mimicking these nano-antennae in solar technology – designing solar cells that use a similar self-regulation capability. It would be a very cost-effective approach.

All of the above is important because the world's global energy demand is soaring, due to population and economic growth. In the short-term, this demand may be met by fossil energy resources such as coal. But finding solutions to stabilise the carbon dioxide emissions from these resources may be an even greater challenge. For this reason the International Energy Agency is strongly promoting renewable energy resources with a low carbon footprint.

Devising such sustainable, environmentally friendly energy resources is one of the greatest global challenges of our age.



## The magic of photosynthesis

Our world has been predominantly shaped by photosynthesis. It's a complex process, finely operating at the border of life and death. Photosynthesis delivers energy to the ecosystem. In doing so, it sustains life. But it can also cause lethal effects whenever an organism is exposed to excessive sunlight. For instance, the damaging effects of intense sunlight is a common issue for crop plants around the world and for photosynthetic micro-organisms that produce oxygen.

Successful photosynthesis depends equally on two things: the efficient harvesting of solar energy and precise regulation of energy flow and dissipation.

To understand this regulation process, we studied protein complexes in cyanobacteria. This was done by using a single-molecule spectroscopy setup in Amsterdam, co-developed by Dr Tjaart Krüger.

The great news is that in future, this sort of research can be conducted on the African continent. Since starting his own research group at South Africa's University of Pretoria early in 2013, Dr Krüger has obtained a grant from the National Nanotechnology Equipment Programme. This has been used to design and build a unique single-molecule spectroscopy system at the institution.

This cutting-edge experimental setup is the first of its kind on the continent. It is sensitive enough to measure individual photons that are emitted from individual molecules. The facility enables researchers to obtain incredibly detailed information about interactions and energy transfer processes inside living cells. We can examine one molecule at a time. This has not previously been possible at such a detailed level.

The setup is currently mainly used to understand the primary processes of photosynthesis in a large range of organisms. These processes are then extracted into design principles that may be used to draw the blueprints of next-generation solar cell devices.

## Real world applications

Our discovery, and others that may follow by using the system which we have built in Pretoria, will hopefully one day be applied in daily life.

Imagine having solar panels on your roof that ensure a constant amount of electricity – regardless of how brightly the sun shines, how cloudy it is or the position of the sun (which may be very different between morning and late afternoon, summer or winter). In other words, the electrical current produced by your solar cells is independent of the environmental daytime conditions out there. When the house owner wishes to have a certain amount of kWh, this is what the smart solar cells will deliver.

One could also create light sensors that not only respond to the smallest unit of light – a photon – to perform their designed function, but operate in a system so intelligently designed that it knows when there is too much light. This same system would be able to control the level of light by harmlessly dissipating all excess light.

Increasing our understanding of how light interacts with natural or synthetic nano-scaled systems holds a fascinating potential for the development of technologies that are currently beyond our imagination.

## About the authors:

**Dr Tjaart Krüger** is employed by the University of Pretoria as senior lecturer. He receives funding from the University of Pretoria and the National Research Foundation. Previously, he received funding from the Netherlands Organisation for Scientific Research and the European Research Council (ERC).

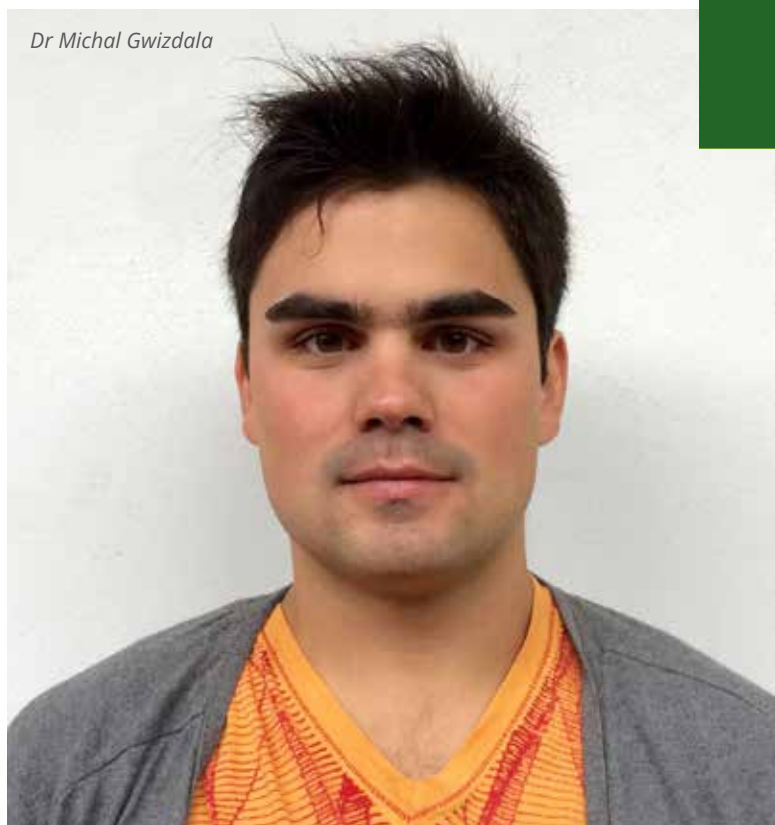
**Dr Michal Gwizdala** receives funding from the Claude Leon Foundation and the National Research Center. Previously, he received funding from the European Molecular Biology Organisation (EMBO) and the European Union FP7 ITN Harvest. He is affiliated with the University of Pretoria, associated with the US Department of Energy, Photosynthetic Antenna Research Center (PARC) and a member of the International Society of Photosynthesis Research (ISPR).

*(Published in The Conversation - <https://theconversation.com>)*

Dr Tjaart Krüger



Dr Michal Gwizdala



# Stakeholders voice demand for policy input on predicting future feed and food availability

Without considering the impact that extreme weather events have on plant growth and yields, we may be over-estimating future food supply, putting nations at risk regarding food insecurity.

The continuous supply of services provided by agricultural systems is increasingly threatened by climate change, in association with an estimated increase in the frequency of extreme weather events such as droughts, heat waves or heavy precipitation events. Thus, improving the accuracy of prediction of crop and pasture yields, is essential for planning for future food security and identifying mitigation and adoption measures for global warming and extreme weather events. Such information is essential for national food security and contingency planning for extreme events. A recent modelling experiment by researchers at the University of Pretoria (UP) shows that models which ignore the effect of extreme weather events in predicting crop yield, could lead to over-predictions and over-confidence in the potential yield of crops.

The main effect of weather on crop performance is already captured by existing models. However, the effect of extreme events (low temperature, high temperature or water deficit) on leaf growth and/or biomass production, pollination, flowering, and seed set are not accounted in existing modelling solutions. An EU-funded Modextreme consortium where Dr Eyob H Tesfamariam, PhD candidate Mr Robert Mangani, and Dr Abubeker Hassen (all from UP) are partners, has developed a modified modelling solution which considers extreme events. The team has characterised these events and predicted these to enable preparedness. The model shows that in Gauteng, predicted maize yields in the near future (2021-2040) and far future (2041-2060) may be up to one quarter lower than current estimations done by existing modelling solutions. Although

Gauteng contributes a relatively small proportion of maize to the overall national supply of this staple food, the impact could be far more catastrophic in the major maize producing areas.

Dr Hassen and Dr Tesfamariam have also conducted research on the effect of drought on grassland productivity, rain use efficiency and forage quality. The effect of climate change and extreme events needs to be quantified at different levels by taking into consideration their impact on farm input supplies, animal production, farm logistics and farm export. Data from the rain manipulation experiment indicated that a 60% reduction in rainfall has resulted in significant change in species composition and up to 50% decrease in forage biomass. In terms of utilisation, a defoliation interval of 60 days generally has resulted in better rain use efficiency compared to a 45 days interval.

Their results provide a deeper understanding of the behaviour of plants under drought conditions and led to the identification of species that are more drought tolerant in natural environments. Their research also provides insight into the potential changes in the nutrient composition and nutritive value of grasses under drought conditions. This is not only of importance to livestock production but also give insight into the possible behaviour of forage and food crops, should climate change lead to increasing bouts of drought.

Stakeholders participating in a workshop to review their findings expressed their appreciation of the thorough and innovative work, calling for greater engagement with representatives from various government departments. The participants expressed their appreciation for the insights shared, saying such knowledge is needed to guide and direct current policy drafting processes for climate change.

*Dr Abubeker Hassen*



*Dr Eyob Tesfamariam*



For more information on this research, please contact Dr Hassen ([abubeker.hassen@up.ac.za](mailto:abubeker.hassen@up.ac.za)) and Dr Tesfamariam ([eyob.tesfamariam@up.ac.za](mailto:eyob.tesfamariam@up.ac.za)).



# Prof Van Marle-Köster new Head of Animal and Wildlife Sciences

"The Department of Animal and Wildlife Sciences is committed to work as a team to ensure the training of animal scientists possessing graduate attributes envisaged by the University of Pretoria (UP). Within these challenging times that we are experiencing, our vision is to perform multidisciplinary research in Animal Breeding and Genetics, Animal Physiology and Animal Nutrition that are relevant to the South African livestock industry."

This in a nutshell is the vision of Prof Este van Marle-Köster, who is the new Head of the Department of Animal and Wildlife Sciences since 1 September 2016. She succeeds Prof Eddie Webb, who is now the Acting Deputy Dean: Research and Postgraduate Education in the Faculty of Natural and Agricultural Sciences.

She holds a PhD in Animal Science, with specialisation in Animal Breeding and Genetics, from the University of Pretoria. Prior to this, she received a master's and honours degree from the University of the Free State in Animal Breeding, and a BSc (Agric) Animal Science from the University of Pretoria.

Prof Van Marle-Köster has been involved in teaching and research for the past 21 years. Her research focuses on the application of

DNA markers and genomics in the genetic improvement of livestock. She is the co-ordinator of the sub-committee for research in the Beef Genomic Programme, and acts as the coordinator for the Dairy Genomic Programme funded by the Technology Innovation Agency (TIA). She has published widely in peer-reviewed journals and contributed to book chapters. She has supervised to completion several master's and doctoral students.

She holds a C2 rating from the NRF and is a registered Professional Animal Scientist with the South African Council for Natural Scientific Professions (SACNASP). She serves as the current Vice-President of the South African Society for Animal Science.

Prof Van Marle-Köster's appointment comes at a time when the visibility of agriculture, including the active and effective presence of the Department of Animal and Wildlife Sciences on the Hatfield Experimental Farm, is a priority for the Faculty. The Faculty will benefit from Prof Van Marle-Köster's expertise to achieve this goal and to make the Faculty of Natural and Agricultural Sciences a leading research-intensive faculty in Africa.

*Prof Este van Marle-Köster*



# Natural Product Chemist leads Department of Chemistry

Prof Vinesh Maharaj, a natural product chemist who was trained in the discovery of new drug leads based on biodiversity samples, was appointed as the Head of the Department of Chemistry from 1 September 2016.

Prof Maharaj holds a PhD in Chemistry from the University of South Africa, with specialisation in natural product chemistry. He received his master's and honours degrees from the University of Pretoria and a BSc (Chemistry) from the University of Durban Westville.

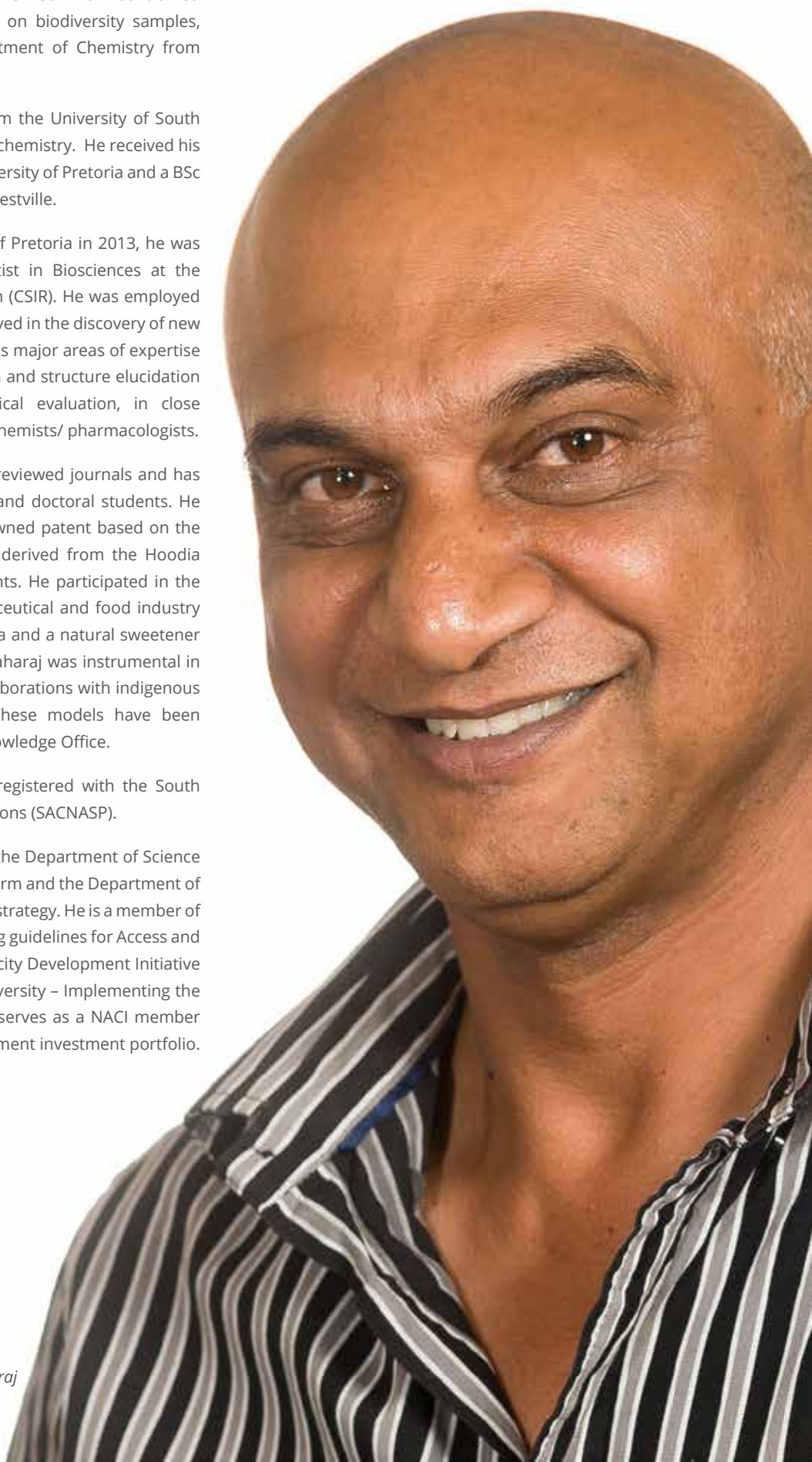
Prior to his appointment at the University of Pretoria in 2013, he was the Technology Manager and Chief Scientist in Biosciences at the Council for Scientific and Industrial Research (CSIR). He was employed by the CSIR for 25 years, where he was involved in the discovery of new drug leads based on biodiversity samples. His major areas of expertise include natural products chemistry, isolation and structure elucidation of natural compounds and their biological evaluation, in close collaboration with molecular biologists/ biochemists/ pharmacologists.

Prof Maharaj has published widely in peer-reviewed journals and has supervised to completion several master's and doctoral students. He is one of the main inventors on the CSIR owned patent based on the discovery of a novel appetite suppressant derived from the Hoodia plant which has over 80 international patents. He participated in the negotiations with the international pharmaceutical and food industry partners on the commercialisation of Hoodia and a natural sweetener identified from an indigenous plant. Prof Maharaj was instrumental in developing benefits sharing models for collaborations with indigenous knowledge holders and bioprospectors. These models have been adopted by the DST National Indigenous Knowledge Office.

He holds a C-rating from the NRF and is registered with the South African Council for Natural Scientific Professions (SACNASP).

Prof Maharaj is also a key team member of the Department of Science and Technology (DST)'s Bioprospecting Platform and the Department of Environmental Affairs Biodiversity Economy strategy. He is a member of GTZ (Germany) and contributed to developing guidelines for Access and Benefit Sharing. This is part of the ABS Capacity Development Initiative for the Africa Programme "People and Biodiversity – Implementing the Biodiversity Convention". Currently he also serves as a NACI member advising DST on their Research and Development investment portfolio.

*Prof Vinesh Maharaj*





# Prof Johann Kirsten says goodbye to UP

A scholar of international stature, an experienced academic leader and a participant in national policy at the highest level – this, in a nutshell, is Prof Johann Kirsten who left the University of Pretoria after many years. He has been appointed as the new Director of the Bureau for Economic Research (BER) at Stellenbosch University from 1 August 2016.

Prof Kirsten started his career as an Agricultural Economist in the Department of Agriculture in Pretoria and also enrolled for postgraduate studies at the University of Pretoria (UP). He obtained a master's degree and a PhD degree in Agricultural Economics at UP and joined the University as a lecturer in 1992. During his career of more than 23 years as academic, as author and co-author he has published more than 110 articles in peer reviewed journals, and also co-edited four books. A total of 65 master's students and 22 PhD students completed their studies under his supervision. He served as a Council Member of the National Agricultural Marketing Council in South Africa from 2001 to 2011 and was also appointed by the Minister of Agriculture as Chair of the Food Price Committee during 2003/4. For the period 2006 to 2009 he served as the Vice-President of the International Association of Agricultural Economists.

His main research interests are agricultural policy, land reform and the economics of origin based foods. In this respect, he was the mastermind behind the legislative process to obtain legal protection for Karoo Lamb and also to establish a certification mark for this well-known iconic South African food.

In response to his appointment, Prof Kirsten said: "I am very excited about my new appointment and new responsibilities at the BER. After almost 25 years at UP and working on the tricky and emotional issues of agricultural policy and land reform, it is going to be an interesting challenge to move to a different, but still related, field of study and expertise. However, it is also true that a change is as good as a holiday and a new challenge is something I look forward to. I hope to make an important contribution to sustain the image and reputation of the BER in producing valuable insights into the performance of the South African economy.

"As I move to a new work environment and a different focus in my career, it is important to let all my friends, colleagues and contacts in the agricultural and food industry know that I will not be lost to agriculture. A good and stable macro-economic environment is also critical for the agricultural sector and therefore I trust that my engagement with, and leadership of the BER team, will also benefit all the companies, commodity organisations and farmers with whom I worked so closely over the years. More specific, I will remain active in my role of supporting the Karoo farmers to protect and promote 'Karoo Lamb' as the icon food product of South Africa. I am also sad to leave the Department of Agricultural Economics at UP, but I am confident that the Department now has a solid foundation and has a great future with wonderful faculty members who will continue to make a solid contribution to agricultural and economic questions on the African continent. I will also continue to work with my current PhD and master's students for the foreseeable future".



*Prof Johann Kirsten*

# Prof Andrew McKechnie leads Zoology and Entomology



Prof Andrew McKechnie, an evolutionary physiologist whose research programme focuses on the thermal physiology of birds and mammals, has been appointed as the new Head of the Department of Zoology and Entomology in the Faculty of Natural and Agricultural Sciences from 1 November 2016.

He plans to consolidate the status of the Department of Zoology and Entomology as a leading research-intensive department in Africa, and to address its transformation challenges.

Prof McKechnie obtained his PhD from the University of Natal in 2002 after which he spent two years as a postdoctoral fellow at the University of New Mexico. In 2004 he returned to South Africa to take up a position at the University of the Witwatersrand, where he remained until accepting a position at the University of Pretoria (UP) in early 2008.

His major current focus area concerns the responses of arid-zone birds to climate change and the use of physiological and behavioural data to develop mechanistic, process-driven approaches to predict the ways in which global warming will affect desert birds. This work involves collaborations with colleagues at a number of local and overseas institutions, in particular the universities of Cape Town and New Mexico. Prof McKechnie also has long-standing research interests in the causes and consequences of metabolic diversity and the ecology and evolution of torpor and hibernation.

Prof McKechnie currently holds a B3 rating from the NRF. He is an associate editor of the journals *Climate Change Responses* and *Emu – Austral Ornithology* and serves on the advisory board of the *Journal of Comparative Physiology B*. He regularly writes for semi-popular magazines, and is a scientific advisor of the *African Birdlife* magazine. He is a member of the DST-NRF Centre of Excellence at the Percy FitzPatrick Institute at the University of Cape Town and a founding member of the South African Young Academy of Science.

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).

Prof Andrew McKechnie



# Final farewell to Dr Nthobane Moji



*Dr Nthobane Moji*

Dr Nthobane Cable Moji (63), a senior lecturer at the Department of Physics in the Faculty of Natural and Agricultural Sciences passed away in his sleep at home on 9 November 2016.

With his friendly, positive attitude he made a significant impact on every staff member and student with whom he interacted and worked over the years and will be sorely missed.

Dr Moji was appointed in 2000 at the University of Pretoria (UP) as a lecturer in the formerly known UP Foundation Programme. The teaching of Physics was his passion. He was keenly interested in improving conceptual learning in Physics by supporting local science teachers. Another interest of his was researching how African indigenous knowledge systems could be used to facilitate the understanding of Physics among African students and teachers.

He developed modules for first-year students who were underprepared for Physics, as well as those who wanted to become teachers. He put his PhD into practice and developed an enquiry based curriculum that dealt with misconceptions in Physics, in particular to help students with the understanding of terminology. He was able to talk to everyone in their own language.

Dr Moji was a founder member of the Southern African Association for Research in Mathematics, Science and Technology Education (SAARMSTE). He is known for his publication, *Physics to African Folk in South Africa* (2005), which was presented at the International Conference on Physics Education.

Nthobane Cable Moji was born in Witsieshoek, Free State in 1952, where he attended both primary and high school. After finishing matric, he went on to study Medical Technology at Mmadikoti Technical College in Limpopo, specialising in virology.

From 1977 to 1983 he practiced at the Garankuwa, Elizabeth Ross and Mofumahadi Manapo Hospitals as a medical technologist. He then proceeded to the University of the North where he was employed as a laboratory technician, while studying towards a BSc degree, majoring in Physics and Chemistry, and graduated in 1986.

After completing his BSc Honours in 1988 he completed an MSc at the University of Natal, titled "Plastic shear in a model amorphous solid" in 1992. He then focussed on Physics education and received his PhD from the University of Natal, with his thesis titled "Physics misconceptions in Mechanics" under the supervision of Prof Diane Grayson. Before joining UP he was a Physics lecturer at the University of the North (QwaQwa) from 1986 to 2000.

# Agricultural Baseline 2016 launched at UP



*From left: Mr Ryan Jayne, Mr Paul Mazungunye, Dr Holger Matthey, Mr Billy Morokolo, Prof Ferdi Meyer, Dr MMatlou Kalaba and Ms Tracy Davids.*

The formal launch of the Annual Agricultural Baseline 2016 for Pretoria presented by the Bureau for Food and Agricultural Policy (BFAP) recently took place at the Faculty of Natural and Agricultural Sciences of the University of Pretoria.

According to Prof Ferdi Meyer, Director of the BFAP, "South African agriculture performed well over the past decade, despite some volatility, owing to its dependence on global markets and an inclement climate. Gross value added by the sector peaked in 2014, but has since declined rapidly as a result of extreme drought in the summer rainfall regions. The severity of the current drought, which combined with substantial exchange rate depreciation to push South African agricultural commodity prices to record levels in 2016, has re-emphasised the importance of a vibrant and sustainable agricultural sector. Contrary to the past decade, where performance was supported by factors such as the commodity super cycle, progress in the coming decade will have to be achieved in an environment of weaker economic growth and lower commodity prices, mainly through increased productivity."

He also added that "compared to the past decade, consumption growth in meat and dairy products is projected to slow in a more

subdued macro-economic environment, but remains sufficient to drive a continuous shift in field crop area from white maize (primarily consumed as food) to yellow maize and oilseeds (primarily consumed as animal feed). Given the weaker exchange rate projection, which supports the competitiveness of South African exports, significant opportunities were identified in the export market for beef, as well as horticultural crops, which are traditionally export orientated. At the same time, the weak exchange rate remains one of the key drivers of food inflation, which is expected to peak in October 2016, before declining steadily under the assumption of normalised weather conditions for the 2016/17 crop."

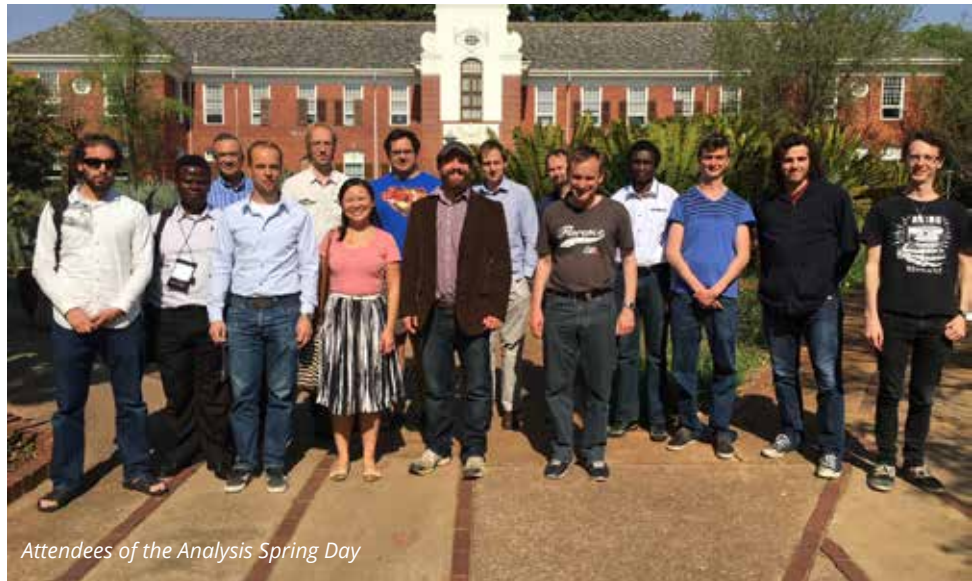
The BFAP is a virtual network, linking individuals with multi-disciplinary backgrounds to create a co-ordinated research system that informs decision-making within the Agricultural Food and Beverage System of South and Southern Africa. The core analytical team consists of independent analysts and researchers who are affiliated with the Department of Agricultural Economics, Extension and Rural Development at the University of Pretoria, the Department of Agricultural Economics at the University of Stellenbosch, and the Directorate of Agricultural Economics at the Provincial Department of Agriculture, Western Cape.



# Analysis Spring Day at Mathematics Department

On Spring Day this year, analysts from the Department of Mathematics and Applied Mathematics at the University of Pretoria (UP), spent a productive day at the inaugural mini-conference, titled *Analysis Spring Day @ UP*.

The day was organised by Jan-Harm van der Walt, Miek Messerschmidt and Eder Kikianty. A total of 17 participants – 10 from UP, six from North-West University (NWU) Potchefstroom, and one from Rhodes University – attended the mini-conference. Speakers at the mini-conference amongst others were David Arogunjo (UP), Charles Maepa (UP), Miek Messerschmidt (UP), Andrew Pinchuck (Rhodes University), Mark Roelands (NWU), Chris Schwanke (NWU), Sanne ter Horst (NWU) and Marten Wortel (NWU).



*Attendees of the Analysis Spring Day*

## Mathematics Midwinter Morning with Dave Pepler

The Department of Mathematics and Applied Mathematics held its yearly Mathematics Midwinter Morning event on Friday 5 August 2015. The speaker for the day was Dave Pepler, renowned South African environmentalist and naturalist and the title of his talk; 'Nearly a triangle: chaos and nature, a personal view'.

Dave shared snippets of his life's journey, starting with less pleasant childhood memories from his Math class, to life changing interactions with wild gorillas. In taking the audience through this journey he demonstrated how challenging it is to predict life. Even with the best mathematical models at hand, nature and biological systems



*Dave Pepler in conversation with one of the guests.*



tend to be 'predictable' in that it somehow always delivers the unexpected. History shows that when we add human nature to these systems, we struggle to anticipate all possible scenarios.

"Sacrifice is not about giving something up, it's about making it sacred". Thanks to Dave and the marketing committee for a most enjoyable morning.

# Food Science and Consumer Science joint forces for Santa Shoebox

## What did you do for Mandela Day?

The postgraduate students, along with some of the undergraduate students and staff members of the departments of Food Science and Consumer Science spent their 67 minutes covering, filling and decorating shoeboxes for their Santa Shoebox Appeal.

The Santa Shoebox Project ([www. santashoebox.org.za](http://www.santashoebox.org.za)) is a national charity which originated in Cape Town in 2006 with only 180 shoeboxes. This year the project is celebrating its 10<sup>th</sup> birthday. In 10 years the Santa Shoebox Project has grown tremendously, with the number of Santa Shoeboxes donated reaching a total of 551 979. The shoeboxes are distributed to more than 1 000 child care facilities throughout South Africa and Namibia, many of them in rural areas. The shoeboxes are packed with basic items, including toothpaste, a toothbrush, a bar of soap, a facecloth, a set of clothes, educational supplies, sweets and a toy. The personal nature of the charity, where gifts are given to children whose name, age and gender is known has led to the charity's continued success.

After covering 59 shoeboxes, the challenge was to fill them. According to Dr Janet Taylor from the Department of Food Science, "we set our target to fill 30 boxes and so match our donation to last year's Santa

Shoebox Project. Our stretch target was to fill all 59 boxes. Over the next few months donations began to pour in, with everyone from both departments contributing generously in some way. We spent several fun sessions personalising notebooks and decorating more shoeboxes. Financial donations helped us to buy clothes and missing items for the boxes. Our most able and thrifty shopping team had a great time choosing the clothes and finding bargains to stretch the money a little further. In spite of the difficulties on campus limiting student access, we had a great team of shoebox packers."

"Finally, the day to deliver the boxes bursting with gifts arrived. Due to the kindness and amazing generosity of the undergraduate students, postgraduate students and staff of the two departments we delivered 69 boxes to the collection centre for distribution to our special kids. That was 10 more boxes than our stretch target. We trust that the children enjoy the contents of their boxes, as much as we all did collecting and putting them together. Imagine 69 under privileged children with smiles on their faces due to the departments of Food Science and Consumer Science working together.



Staff and students the departments of Food Science and Consumer Science with their contributions to the Santa Shoebox project



# Mathematics Department celebrates 'Take a Girl to work'

Earlier this year the Department of Mathematics and Applied Mathematics celebrated 'Take a Girl to Work' day by hosting seven high school girls on campus for a day of mathematics fun. Dr Eder Kikianty gave an inspiring talk on *Fermat's Last Theorem*, highlighting the role women played in mathematics with Monsieur le Blanc, alias Sophie Germain, and Joan Clarke. Dr Madelein Labuschagne spoke about a career in mathematics. The girls enjoyed tea in the garden, attended a first year engineering mathematics class, went on a campus tour and enjoyed lunch. The participating girls were Alexia Daniel and Chane Nel from Pretoria High School for Girls, Ntshikeng Matooane and Khanya Nxomani from St Mary's DSG, and Karlien Smith, Ane Venter and Kara Steenkamp from Afrikaanse Hoër Meisieskool.

Dr Eder Kikianty



# Prof Machethe delivers FR Tomlinson Commemorative Lecture

Prof Charles Machethe, Acting Head of the Department of Agricultural Economics, Extension and Rural Development, was honoured to present the 2016 FR Tomlinson Commemorative Lecture during October in East London, Eastern Cape Province.

Prof Machethe's lecture was titled *The Agricultural Economics Discipline in a Socially Transforming South Africa: Status, Effects, Responses and the Future*.

The FR Tomlinson Commemorative Lecture was launched by the Agricultural Economics Association of South Africa (AEASA) in 1986 as a special, prestigious event, during which the lecturer receives the FR Tomlinson Commemorative Medal.

Prof Tomlinson was the first president of AEASA and doyen of the agricultural economics establishment in South Africa. He is well-known for having chaired the Commission of Inquiry into Socio-economic Development of the Bantu Areas within the Union of South Africa (the so-called Tomlinson Commission) (1955).

*Prof Charles Machethe*





# Successful workshop on solar fuel and energy storage

South Africa has enormous untapped renewable supplies of solar energy in large, low-populated areas, on par with the best in the world. During October a workshop on the theme, *Solar Fuel and Energy Storage*, was presented in Pretoria. During this workshop the potential of solar energy was explored.

A recent study jointly carried out by the CSIR, SANEDI, Eskom and the Fraunhofer IWES in Germany also concluded that geographically averaged wind energy in South Africa is ideally complementary in its cyclic availability to solar energy for places connected to the national electricity grid. This means that up to 50% of the country's electrical power demand can be satisfied without the need for additional storage options.

However, a large fraction of the population in sub-Saharan Africa is still not connected to an electricity grid. For such off-grid situations as well as for mobile applications energy storage is indispensable.

The workshop was organised and supported by a Joint Swiss-South African Research Programme (SSAJRP), funded by the South African National Research Foundation and the Swiss National Science Foundation. Two groups from the departments of Chemistry and Physics at UP were also engaged, in collaboration with the group of Dr Artur Braun from Empa in Switzerland, with a project titled *Production of Liquid Solar Fuels from CO<sub>2</sub> and Water Using Renewable Energy Resources*.

The workshop represented the closing event of a successful three-year funding period. The program of 21 lectures by local and international experts and students attracted close to 50 attendees who engaged with interest in the potential and implications of a transition to a renewable energy future, with a special focus on the South African situation.



Participating members of the Joint Swiss-South African Research Project



# Successful workshops on Quantitative Genetics and Genomic Selection

The Forest Molecular Genetics (FMG) Programme in the Department of Genetics and FABI recently organised a training workshop on Quantitative Genetics and Genomic Selection in Forest Tree Species, in Pietermaritzburg, Kwa-Zulu Natal. The workshop aimed at skills and capacity development in the South African tree breeding community.

The workshop was co-funded by the Forestry Sector Innovation Fund and Forestry South Africa, and co-presented with Prof Fikret Isik and Dr Juan Acosta from North Carolina State University (Raleigh, NC, USA). The workshop was attended by representatives from Sappi, Mondi, York Timbers, Hans Merensky Foundation, MTO Forestry, Komatiland Forests, NCT, the Institute for Commercial Forestry Research (ICFR), and the University of Pretoria.

The event not only allowed exchange of expertise in quantitative genetics and genomic selection in forest trees, but also resulted in strengthened collaboration between the companies, the FMG Programme at UP and the Camcore tree breeding and conservation co-operative at NC State University.



*Attendees and presenters at the training workshop*



# UP hosts Maize Symposium in partnership with Mexican Embassy and SAAFoST

Following the signing of a Memorandum of Understanding between the University of Pretoria (UP) and the National Autonomous University of Mexico (UNAM), the Mexican Ambassador to South Africa, his Excellency Mr Mauricio Escanero instigated an initiative to bring together scientists working on food security in sub-Saharan Africa, with their counterparts in Mexico.

This mini symposium, which coincided with the United Nations Food and Agriculture Organization's World Food Day, specifically focussed on informing the local food industry of the benefits of the technology of nixtamalisation which is used to process maize in Mexico. The Embassy of Mexico in South Africa, together with UP, in collaboration with the South African Association for Food Science and Technology (SAAFoST) hosted this mini symposium on Maize Nixtamalization at the Mexican Embassy in Pretoria.

In his opening address at the mini symposium the Ambassador Escanero said: "Although Mexico has gifted maize to the rest of

world, on its journey to Africa it lost its luggage – the knowledge on how to cultivate maize sustainably and how to process it to optimise its nutritional quality and ensure food safety."

Three presentations were made by the Mexican experts: *Nixtamalization: Past and Future* by Dr Luis Alberto Vargas (UNAM); *Ingredients for Nixtamalization: Quality and Impact in Processed and Final Products* by Dr Grizelda Vasquez (Mexican National Forestry, Agriculture and Livestock Research Institute, INIFAP) and *Techniques of Nixtamalization and Industrial Processing Possibilities* by Dr Yolanda Salinas (INIFAP).

The speakers were introduced by Prof Sheryl Hendriks, Director of the UP's Institute for Food, Nutrition and Well-being and the mini symposium concluded with an expert panel discussion led by Prof John Taylor from the Department of Food Science. The vote of thanks was given by Prof Edward Webb, Acting Deputy Dean: Faculty of Natural and Agricultural Sciences at UP.



Speakers and expert panel members, from left: Prof John Taylor, Prof Edward Webb, Dr Grizelda Vasquez, Dr Luis Alberto Vargas, Dr Minah Mosele (Botswana National Food Technology Research Centre), Mr Nigel Sunley (SAAFoST Past-president), Ambassador Mauricio Escanero, Dr Robert Young (SA food manufacturer), Dr Yolanda Salinas and Mr Owen Frisby (SAAFoST National Director).

# UP presents Second South African Malaria Research Conference

Although South-Africa is approaching malaria elimination, it remains a disease burden in various parts of the world. Climatic changes and/or population movements in the area may favour malaria transmission, possibly reintroducing the disease in malaria-free areas.

Earlier this year, the University of Pretoria Institute for Sustainable Malaria Control (UP ISMC) presented the 2nd South African Malaria Research Conference at the University of Pretoria's Groenkloof Campus.

The battle to control malaria is currently largely based on two strategies, namely control of the vector (mosquitoes), and control of the malaria parasite. Novel approaches to raising community awareness and support for public health campaigns are also important and will enable communities to contribute to an integrated management approach.

This conference was the follow-up to the very successful first conference hosted by the South African Medical Research Council (SA MRC) in Durban in 2015 and brought together the malaria community and students involved in malaria-related research. To highlight the importance of trans-disciplinary approaches and

alternative methods of fighting malaria, the conference was themed 'Towards malaria elimination: research, innovation and education'. The delegates were provided with the opportunity to share their malaria-related research and at the same time learn from experts in their respective fields.

All postgraduate students and staff from the Malaria Parasite Molecular Laboratory (M2PL), which is part of UP's Department of Biochemistry and the ISMC, attended the conference and had the opportunity to present their research. This includes seven oral presentations and 15 poster presentations. This presented the students with the opportunity to showcase novel findings, innovation, ground-breaking research and on-going collaborative efforts to eliminate malaria. Interesting topics that were discussed included: human interventions towards malaria control and elimination, including malaria education, health promotion and surveillance; novel methods to control the parasite and block transmission; innovative and alternative vector control methods; the use of various technologies to predict potential outbreaks; the impact of climate change (remote sensing); and even the use of mathematical modelling to determine the effectiveness of new control tools.





# Crypto Giants' raise Maths awareness at Open Day



*Crypto Giants in action*

During the University of Pretoria's annual Open Day, \*the Crypto Giants (CG) from the Department of Mathematics and Applied Mathematics increased their mathematics awareness campaign by engaging learners with interesting mathematics conversations and the running of a mathematics competition. They kicked off the day at high energy levels, ready to impact lives and change mind sets.

The CG Mathematics competition consisted of eight questions that tested basic high school mathematics skills and logic. A total of five winners were announced with hourly intervals and each winner received a prize.

The competition participants amounted to 146 learners, with seven learners (from Stanza Bopape Secondary School, Khamane MST Academy, Lydenburg Hoërskool, and Basa Protea) showing interest in pursuing a Mathematics degree.

As David Hilbert said, "Mathematics knows no races or geographic boundaries; for mathematics, the cultural world is one country." This was clearly seen throughout the day. Some of the careers that were discussed, included that of a mathematics researcher, a cryptologist, a data scientist, a quantitative analyst, a risk manager and a lecturer, to name but a few.

The learners also had the opportunity to speak to Dr Maluleke, who is a Cryptologist, and Dr Mabula, who is a Mathematician, specialising in Functional Analysis. They are both from the Department of Mathematics and Applied Mathematics.

The Crypto Giants had an awesome time imparting wisdom and the love of mathematics and concluded with the comment, "We wish all the learners the best with their studies and hope to see them next year studying maths. The CGs would like to extend a special thank you to the SARChI Chair: Under-twenty Mathematicians. Your contribution made the day successful!"

\*The Crypto Giants is an undergraduate mathematicians' initiative which has as members young, enthusiastic, diverse and mathematically-minded individuals who are passionate about the complex properties of numbers, as well as mathematics as a whole and its application in daily life. They embark on a problem-solving journey by addressing various mathematical problems and research projects, which will help them to enhance their mathematical skills, and analytical thinking processes, and at the same time discovering different approaches to problems at hand.

# Great interest in Mathematics competition



Prize winners from Deutsche Schule Pretoria

During August 2016 sixty schools participated in the 2016 Department of Mathematics and Applied Mathematics' Annual National Maths Competition.

There really was a great amount of interest from the schools, with more than 1 600 learners participating. In the category for Grade 6 and 7 there were 220 entries, for Grade 8 and 9 there were 745 entries, while in the category Grade 10 and 11 the total amount of entries were 672.

A first prize and top five position prizes were awarded to the learners in each of the respective grades. An amount of R1 000 was awarded to first prize positions and R500 to the top five positions. (Results are available on <http://www.up.ac.za/en/mathematics-and-applied-mathematics/article/47663/up-mathematics-competition>)

The Deutsche Schule Pretoria won the prize for the best school in the Mathematics competition.

## Sci-Enza celebrates National Science Week

National Science Week (NSW), an initiative of the Department of Science and Technology (DST) is a countrywide celebration of Science, involving various stakeholders and/or role-players conducting science-based activities during the week. This year, Sci-Enza, the oldest interactive Science Centre in South Africa, again participated and hosted a variety of activities during August.

The activities included a Water Science Show and a Water Workshop, as well as an Ocean Puppet Show and Workshop. The well-known author, Ginny Stone and author of the *Sibo* book series, also hosted a book-reading of the book *Sibo Tackles Trash*. Another fun-filled activity was the Robotics Workshop.

Some public talks were also hosted, with topics such as *Women in Science* and *A tour of the Universe*.

National Science Week is run simultaneously in all nine provinces at multiple sites per province. SAASTA has been appointed by the DST as the implementing agency and plays the role of the National Project Manager for the National Science Week. Each year a different theme is chosen and activities are presented to the target audiences around the theme. The theme for 2016 was *Science for Sustainable Development and Improved Quality of Life*.





# Inaugural TuksChess Open - Real King Makers at Sci-Enza

In August 2016 TuksChess hosted their first ever Open rated tournament since its re-establishment in 2010.

The TuksChess Open Rated Inaugural was hosted at the Groenkloof Campus Sports Hall. Players arrived in large numbers from Tshwane, Johannesburg and even from Potchefstroom. The permitted number of participants is fifty, but we expected a hundred players to arrive. However 85 players attended the tournament. The tournament was Chess South Africa (CHESSA) rated. It consisted of six rounds with time controls of 60 minutes per player. There were three sections (Section A, Section B and Section C). The tournament was organised by Godfrey Kgatle of TuksChess and officiated by some of the top Gauteng arbiters, Fransie Grobbelaar (Chief arbiter), Lelanie van der Westhuizen (arbiter), Ruan Steenkamp (computering) and Carlia Venter.

Section A players needed to have a rating of 1 300 and above. This section was blessed by the presence of two International Masters (IM), Daniel Jere and Johannes Mabusela. IMs are second ranked chess players in the world after Grand Masters. Daniel Jere with a rating of 2363 and Johannes Mabusela with a rating of 2244, can be considered to be the finest players in the country. There are only three IMs in South Africa. Amongst the top players is Roland Bezuidenhout, a Section A player who is a member of the University of Pretoria's TuksChess club. Roland is a Fine Master (FM) with a rating of 2049 and has won the u/20 Commonwealth Championship in Sri Lanka in July 2016. Varden Trevelyn (aged 14) was another FM who earned his title by winning the African Youth Chess Championships in 2012 at the age of 10.

Section B catered for players with ratings from 600 to 1299, while Section C had an age restriction of 11. The players of these two Sections are generally still in their chess developing phase and still need coaching. While many categories in other sport types are determined by age, chess sections are determined by chess ratings, which players earn by winning rated tournaments such as the TuksChess Open. This explains why a 10 year old girl beat a 40 year old man in several games.

The prize pool of the tournament amounted to R10 000, with the top three players in each section receiving prizes. The winners of Section C were mainly TuksChess Junior players, with young lady Kayliegha Weideman taking first place, followed by Keanan Fouries and Yoshua Smit. The Section B winners were Gerhardus Bekker, David Lubbe and Daniel Wohlfarht. The winners of Section A were IM Daniel Jere, FM Roland Bezuidenhout and IM Johannes Mabusela. Jacqui Grobbelaar was awarded a prize for being the Best Lady. Three of the TuksChess Junior players (Lehan Koning as well as Henco and Jane Malan) could not attend the tournament because they were representing the u/8 section of the South African Chess Team at the African Youth Chess Championships in Port Elizabeth.

*Article submitted by Godfrey Kgatle*



We appreciate the attendance of players as this was a good learning opportunity for many of the upcoming players. The general comments of the players were that the tournament was hosted at a lovely venue and it was a high quality tournament that was well organised and surely gave them ample opportunity to learn. The next TuksChess major tournament will be in December at the University of the Western Cape.

TuksChess would like to thank all their sponsors and support structures, such as TuksSports, TuksRes, Sci-Enza, UP-SRC, Tshwane Chess, Department of University Relations and Lucille Weyer. We believe that in the coming years, TuksChess Open will be one of South Africa's most popular annual tournaments. The TuksChess Open 2016 provided players with a platform where they interacted with each other regardless of their age and background while they also engaged in the competition and tapped into each other's knowledge of chess. This is why we consider chess to be a holistic and dual beneficial sport.



# South African Mathematics Team Competition at UP

The annual 2016 South African Mathematics Team Competition (SAMTC) was held on 10 September at the University of Pretoria (UP). This is the annual event where the top mathematical high school learners compete on provincial level. Learner achievements in the second round of the SA Maths Olympiad, and the \*Siyangoba Programme determined which members would comprise the teams.

This year two junior and two senior teams participated as the Gauteng North representatives. Gauteng North traditionally provides fierce competition during the event. The results were as follows: Junior Gauteng North 9/35; Junior Siyangoba UP 16/35; Senior Gauteng North 16/44; Senior Siyangoba UP 13/44. Congratulations to these learners.

The team manager was Ruaan Kellerman and the Siyangoba coaches were Harry Wiggins and Eben Maré. To learn more on how SAMTC works, please visit <http://www.up.ac.za/mathematics-and-applied-mathematics/article/47657/south-african-interprovincial-mathematics-olympiad>.

Results of the competition are available at <http://www.samf.ac.za/assa-team-results>.

\*The Siyangoba Regional Olympiad Training Programme is a Mathematics Olympiad Training Programme sponsored by the Department of Science and Technology (DST) and organised nationally by the *South African Mathematics Foundation*. The programme has regional centres across South Africa. The Department of Mathematics and Applied Mathematics at UP is the regional centre for the North Gauteng region (Pretoria and surrounding areas).

The programme is targeted at mathematically gifted learners who have an interest in Mathematics. It is not a remedial programme and is not intended for learners who struggle with Mathematics and seek extra instruction on school work.



**Senior Siyangoba UP:** Back: Adriaan de Clercq (captain) (Hoërskool Zwartkop), Frances de Klerk (Hoërskool Menlopark), Kaylee Harris (Pretoria High School for Girls), Zian Hoek (Hoërskool Menlopark), Heejin Jung (Pretoria High School for Girls) and Duan Kilian (Hoërskool Waterkloof). Front: Mischa Kuschke (Hoërskool Menlopark), Dricus Oerlemans (Die Hoërskool Menlopark), Armin Steenkamp (Hoërskool Waterkloof), Anton van Wyk (Hoërskool Waterkloof) and Amirah Kaprie (reserve) (Al-Asr Educational Institute).



**Junior Gauteng North:** Back: Adriaan du Toit (Afrikaanse Hoër Seunskool), Rynhard Fourie (Midstream College), Ruben Grobler (St Alban's College), Mel Janse van Rensburg (captain) (Pretoria Boys High School) and BoSeok Kim (Pretoria Boys High School). Front: Daniel Lobo (Pretoria Boys High School), Tristan Lunt (Pretoria Boys High School), Dylan Nel (Pretoria Boys High School), Cassie Pelsner (Hoërskool Waterkloof) and Attie Senekal (Hoërskool Die Wilgers).



**Senior Gauteng North.** Back: Johannes Conradie (Hoërskool Zwartkop), Ashton Crawford (Afrikaanse Hoër Seunskool), Silvia Eldring (Hatfield Christian School), Dirk Kotze (Midstream College) and Duncan Matthys (Midstream College). Front: Graham Mitchell (Pretoria Boys High School), Fidel Molalu (Pretoria Chinese School), Mpho Nkwana (captain) (Clapham High School) and Jaco-Louis Venter (Afrikaanse Hoër Seunskool), Christiaan Wagner (Hoërskool Menlopark).



**Junior Siyangoba UP:** Back: Muhammed Abdul-Kader (Al-Asr Educational Institute), Christiaan Bauman (Hoërskool Waterkloof), Ilze Bellingan (Hoërskool Menlopark), Lourie Bosman (Laerskool Menlopark) and Unathi Dlepuma (Iona Convent High School). Front: Nadia Fourie (Laerskool Lynnwood), Dalen Lombard (Laerskool Menlopark), Nurah Mukaddam (Al-Asr Educational Institute), Shuaib Nuruddin (Al-Asr Educational Institute), Kimberley Taku (captain) (Deutsche Schule, Pretoria) and Katelyn Hendrickse (reserve) (Crawford College, Pretoria).