

# Science Matters

## Science Faculty Newsletter



### Message from the Deam



With mid-year already upon us, the year appears to have passed unusually quickly, perhaps due to the busy start of the year with the continuation of the 2016 November examination period, and the late start to the 2017 first semester. After the frustrations experienced by all with the disruptions to the 2016 University teaching calendar, due to often intimidating and at times violent student protests, 2017 has been pleasingly quiet. Classes have been offered without disruption, our students have gone about their business with enthusiasm to learn, and mid-year examinations are nearly upon us. I remain deeply grateful to all staff who persevered through the difficult times late in 2016 and continued to help those students who were interested in pursuing their academic studies through into January of this year.

Despite the negative message portrayed in the media about activities on UCT's campus last year, we attracted a record number (~6500) of

undergraduate applications. Concern that the student disruptions and the very late start to the 2107 academic year might influence registrations in 2017 were fortunately unfounded, as we met, and very slightly exceeded, our first-time entering undergraduate target of 450 students. A second unusual feature of this past first semester was the holding of our main graduation ceremony in early May. A record number of undergraduate students graduated, with the highest ever number achieving their degrees with distinction. It was also pleasing to see how many of our Honours students achieved their degree in the First Class.

There has been much to celebrate this first half of 2017, and staff and students continue to excel and reap rewards for their achievements. The Director of the Fitzpatrick Institute of African Ornithology, Peter Ryan, became the latest staff member to achieve an A-rating by the NRF, with ornithology at UCT in general being ranked third globally in subject rankings. Three of our younger staff were awarded prestigious Claude Leon Foundation Merit Awards for their research, and three of our staff received UCT Distinguished Teacher

Awards – two from one department (Maths & Applied Maths). Very prestigious international awards were garnered by staff members in Environmental & Geographical Science (2017 Premio Daniel Caresso Prize—Jane Battersby-Lennard) and in the Percy Fitzpatrick Institute for African Ornithology (Bicentenary Medal of the Linnean Society of London—Claire Spottiswoode). Our postgraduate students continued to garner national awards for their research and presentations – a number for communication of their science to the general public. The first Faculty based MOOC (Massive Open Online Course) was released by Professor Anusuya Chinsamy-Turan from Biological Sciences.

In late May the Faculty felt the very sad loss of one of its long serving colleagues, Associate Professor Mike Lucas, who passed away unexpectedly in this, his final year at UCT before retirement.

The following pages capture highlights of a selection of research achievements, and illustrate the breadth and depth of the research endeavours of our staff.

**Anton le Roex**



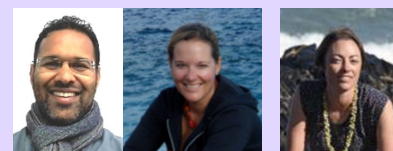
### New A-rated Scientist in the Science Faculty

**Professor Peter Ryan**, (pictured left), Director of the Percy FitzPatrick Institute of African Ornithology, in the Department of Biological Sciences was recently awarded an A-rating by the NRF for the quality and impact of his research outputs. Peter is a well-respected seabird biologist who also works on island conservation and restoration, and the impacts of power infrastructure and other threats to birds. He is perhaps best known for his research on plastics in marine systems, and particularly their impacts on seabirds. This is the first A-rating for a Percy FitzPatrick director and the first for an ornithologist in South Africa.

### Three Claude Leon Merit Awards for Science

The Science Faculty congratulates three staff members who have been awarded Claude Leon Merit Awards, which recognise early-career researchers of distinction. They are:

- **Dr Sahal Yacoob**—Department of Physics
- **Dr Sarah Fawcett**—Department of Oceanography
- **Dr Katye Altieri**—Department of Oceanography



L to R: Dr Sahal Yacoob, Dr Sarah Fawcett & Dr Katye Altieri



# Our Science Stars:

## Distinguished Teacher Awards

The Faculty of Science is proud to have three staff who received Distinguished Teacher Awards this year. They are:

### Dr David Erwin: Department of Mathematics & Applied Mathematics

David Erwin has enjoyed a lengthy career in teaching mathematics. He comments:

“Teaching is itself a learning process. We get better at it – if we want to. Good teachers learn from their students and, through a process of self-reflection and critical engagement, decide what worked and what needs to be done better, or completely differently, next time”. His philosophy is that of creating a comfortable classroom, keeping students focused and developing the structures they need to succeed. Students attest to his ability to inspire their interest in mathematics and a desire to learn, entertaining classes, while at the same time maintaining mathematical rigor. Dr Erwin is renowned for developing conceptual frameworks that enable an understanding of mathematics and demonstrates innovation in his development of resources, web work and use of social media to complement his teaching. His colleagues attest to his impact beyond the classroom.



### Dr Jonathan Shock: Department of Mathematics & Applied Mathematics



Within a short space of three years, Jonathan Shock has developed a reputation of excellence. One student remarks that an infamous first-year mathematics course is like diving into the Atlantic Ocean without a wetsuit, but that Dr Shock makes it clear why the metaphorical sea has so much to offer – he encourages deep understanding and a level of inquiry past the curriculum. A colleague remarks: “In my opinion, what sets apart a distinguished teacher from many, merely excellent ones, is the lasting impact that they have on their charges. If, 10 or 20 years hence, you were to ask many students who have passed through UCT's daunting first-year mathematics course who they remember the most, it will be Dr Jonathan Shock”.

He is renowned for his technological innovation, academic development and support, and consistently outstanding evaluations across many levels of teaching in the discipline. His ability to change students' perceptions of infamous courses is put down, by many, to the fact that he simply cares, going beyond to develop a rapport with students to enable access to the discipline of mathematics.

### Dr Miguel Lacerda: Department of Statistical Sciences

Dr Miguel Lacerda comments that he attempts to make content meaningful and accessible. He acknowledges a student audience that is diverse in terms of academic ability, learning style and cultural background, all which inform his approach to teaching. He strives to stimulate interest, and to develop sound reasoning and independent learners. He is methodical in his approach, connecting the dots between previous material and adopting a scaffolded approach; mending shaky foundations that students may have had in the daunting discipline of Statistics, and developing in them a mindfulness about the ‘bigger picture’. He is renowned for his innovation and curriculum development in the discipline, and has developed links between the curriculum and industry. He is keenly involved in promoting statistics as an exciting career path in its own right. He is frequently cited as the best lecturer in his department. He consistently scores excellently on all the courses that he has taught since 2010 and is described by one student as ‘my teacher, my mentor, my hero and my role model’.



## Ornithology at UCT ranked third globally in subject rankings

When the Centre for World University Rankings (CWUR) recently released their inaugural subject rankings, UCT was placed in the top five of over 26 000 higher education institutions in two subjects, one of which was Ornithology. Based on the number of research articles in top-tier international journals, these rankings highlight the world's elite universities in the sciences and social sciences.

**Professor Peter Ryan**, director of the FitzPatrick Institute of African Ornithology, comments, “This is a great recognition of the contribution that researchers at UCT make towards ornithological studies.”

## Dr Jane Battersby-Lennard wins international food security prize

**Dr Jane Battersby-Lennard**, from the African Centre for Cities in the Department of Environmental & Geographical Science, has been awarded the 2017 Premio Daniel Carasso prize, which rewards and encourages outstanding scientific research into sustainable food systems and diets for long-term health. Battersby-Lennard's research shows that addressing food insecurity can improve health, develop a more inclusive economy and increase environmental sustainability.



**What does becoming a Premio Daniel Carasso laureate ambassador for sustainable food and diets mean to Jane and her research in food security?** Jane says, "It is hugely exciting as it means that the sustainable food world is really starting to acknowledge the importance of the urban food security challenge. My work explicitly connects food security, justice and sustainable food systems. The links between production and consumption and between sustainability and equity have not always been recognised. The position that I have taken on food security has not always been well received within the development and policy world, as it challenges perceived wisdom on where the food insecure live (the rural areas) and what the solutions are (encouraging own production). Hopefully, the award will validate my position."

**The prize is intended to give more visibility to a mid-career researcher and to help them inspire junior researchers to develop transdisciplinary approaches to sustainable food systems. How does Jane plan to use the award of €100 000?** She replies, "I will be using a portion of the prize money to support students working on urban food systems. This is an emerging field and I'm keen to develop a cohort of researchers who can work across disciplinary boundaries. The ideal would also be to use some of the funds to buy some time to write a book reflecting on what my work has cumulatively revealed about food systems and how they interact with urban systems. As researchers, we don't often get a chance to step back and reflect on the bigger picture."

## Association of Commonwealth Universities Award for Archaeologist



**Associate Professor Shadreck Chirikure**, Department of Archaeology, was awarded an Association of Commonwealth Universities (ACU) Fellowship award. The fellowship is aimed at bringing leading scholars from the members of the ACU network to the University of Oxford, to develop collaborations. Associate Professor Chirikure's work focuses primarily on the metallurgy of major southern African archaeological sites and this research collaboration will see the use of advanced techniques and theoretical frameworks to understand farming, inequality and other issues at Great Zimbabwe and other important sites in Africa.

## Dr Sheetal Silal impresses at FameLab: Science Communication Competition

**Dr Sheetal Silal**, senior lecturer in the Department of Statistical Sciences, was first runner up in the FameLab national competition. The top 10 contestants (selected from 200 participants) from across the country met at the Sci-Bono Science Centre in Johannesburg to battle it out for top place. "FameLab has been an incredibly positive experience for me," says Silal. "It's helped me think about how to communicate abstract mathematical topics in a universally understood manner and has highlighted the importance of making our research known to the public".

Dr Silal presented on her work about mathematical modelling of infectious diseases. While her presentation used tuberculosis (TB) as an example of how infectious diseases spread around societies and how scientists use mathematical modelling to understand and track that spread, her primary research is focused on malaria elimination efforts in Southern Africa.



*Dr Jabu Nukeri from SAASTA (first left); Dr Sheetal Silal (middle) Ms Anisa Khan from the British Council*

## Multiple awards for Professor Claire Spottiswoode

**Professor Claire Spottiswoode**, Pasvolsky Chair of Conservation Biology, from the Percy FitzPatrick Institute in the Department of Biological Sciences, has been awarded the Bicentenary Medal of the Linnean Society of London. This scientific award is awarded annually in recognition of work done by a biologist under the age of 40 years.

Spottiswoode was also awarded the Scientific Medal of the Zoological Society of London, for distinguished work in Zoology.

Professor Spottiswoode recently received a Consolidator Grant from the European Research Council, held jointly at UCT and the University of Cambridge, UK, to the value of €2 million, in order to support research on the honeyguide-human interactions in Mozambique.





## Biological Sciences ecologist wins British Ecological Society prize



Ecologist and MSc student **Gabriella Leighton** (pictured left) has won a British Ecological Society Young Investigator prize. The prize – one of only five awarded each year – recognises the best research papers published in BES journals by early career scientists. Gabriella won the Robert May Prize for the best paper in the BES journal *Methods in Ecology & Evolution* in 2016 for her paper 'Just Google it: assessing the use of Google Images to describe geographical variation in visible traits of organisms'. Gabriella analysed online image data across a range of species, from black bears in western North America to black sparrowhawks in South Africa, comparing data on their colour, collected by fieldworkers with data from Google images, and found that the online images are a very reliable source of data. **Dr Arjun Amar**, from Biological Sciences, co-authored the paper.

## Young science communicator award for agroecologist

**Zander Venter**, a doctoral candidate from Biological Sciences entered the NRF SAASTA young science communicators competition in the video category and came second. His video, *Our footprint from space* was stitched together with free online software “and quite a few hours of cutting and pasting video segments to create a smooth finished product”, says Zander.



Venter's PhD in agroecology is focused on livestock grazing management. He measures grass and soil in the field and uses satellite imagery to detect the path of cattle on vegetation. “During my procrastination time I would create time-lapse videos of different parts of South Africa just for fun,” Venter says. “Here, I discovered some amazing changes in the landscape and compiled the video that I finally entered for the NRF competition.” He has no background in film editing, apart from a short stint on the SABC show *50/50*, where he worked as a researcher and scriptwriter. To view his video, click here: <https://www.youtube.com/watch?v=Vw0UFdz01n4>

## Mathematics Professor is recipient of Chair de la Vallee Poussin

**Professor George Janelidze**, Department of Mathematics & Applied Mathematics was recently awarded the Chair de la Vallee Poussin by the Lovain-la-Neuve University, Belgium, where they invite a distinguished mathematician each year to give four lectures on a topic that he/ she chooses.

## Prestigious fellowship award to Astronomy PhD student



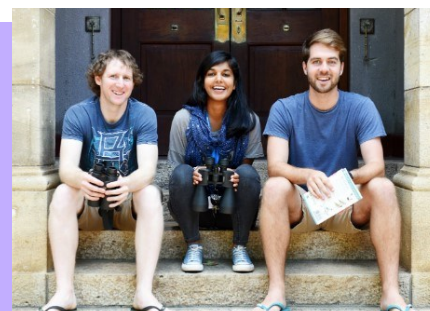
Astronomy PhD student **Khaled Said** - a recipient of the Science Faculty PhD scholarship, has just been awarded the Gruber Foundation Fellowship by the International Astronomical Union (IAU). The annual fellowship, for young astronomers, is for the amount of US\$50 000 and is awarded to an extremely promising young investigator working in any field of astrophysics.

Khaled Said studies cosmology, looking at galaxies located in the region of the sky obscured by the Milky Way, known as the Zone of Avoidance, with the aim of gaining better insight into the distribution and dynamics of galaxies in the local Universe.

Khaled will hold his fellowship at the Australian National University, where he will continue this work, but over a much larger area of sky — the entire southern hemisphere. He is honoured to receive the fellowship and says: “I'm very grateful to the IAU and the Gruber Foundation for selecting me. The Gruber Foundation Fellowship will allow me to continue to develop my career in cosmology; it's a great step towards making my next goals come true.”

## Birders excel at Champions of the Flyway

Three UCT students took part in the annual Champions of the Flyway bird race in Israel during April. The race pits teams from across the globe, against one another, in a grueling 24-hour race to identify as many bird species as possible. One of the aims of the event is to raise funds and awareness around the illegal killing of birds along their migratory flyways. **Jessleena Suri** (PhD student from Statistical Sciences) and **Andrew de Blocq** (MSc student in Biological Sciences) competed with the Birding Ecotours Youth Africa and raised close to €9 000—more than €2 000 more than any other team; and took home the title Guardians of the Flyway for their efforts. They were also awarded the Knights of the Flyway title for their awareness campaign, which included a variety of social media and canvassing at traffic lights in creative outfits. **Dominic Rollinson** (PhD student from Biological Sciences) who was part of the Birding Africa Black Harriers team, identified 163 species, which placed their team joint sixth out of 19 teams.



*Dominic Rollinson, Jessleena Suri & Andrew de Blocq*

## Computer Science team wins Technology Impact Challenge Heats

This year saw 13 UCT teams participate in the regional team-based programming contest organized by Standard Bank, where the winning team will go to the finals in August in Johannesburg to compete against the top teams of the other South African universities. At this challenge, teams of 3-4 students have to solve as many problems as possible within the four hours of the contest, with only one PC per team and no internet access. The team that solves the most problems, wins.



UCT took the first four spots in the top-5, including first overall. The top-5 performing UCT teams were:

1. Inconsistent Axioms, consisting of **David Broodryk**, **Andrew McGregor**, **Yaseen Mowzer** and **Bronson Rudner**. They solved 7 problems, and were the only team to achieve this.
2. Git gud, consisting of **Jonathan Alp**, **Jonathan Bouwer** and **Zakariyah Toyer**. They solved 5 problems in the least amount of time, and came in second in the overall classification.
3. Super Badasses Trained in Coding, consisting of **Robert Bodley**, **Oliver de Bruin**, **Guy Paterson-Jones** and **Cary Small**. They also solved 5 problems and came third in the overall classification.
4. 404 team name not found, consisting of **Claude Formanek**, **Matthew Morris** and **Jeremy Wilkinson**, also solved 5 problems and scooped fourth position overall.
5. QWERTY is dead, consisting of **JonJon Clark**, **Victor Gueorguiev**, **Tae-Jun Park** and **Jason Smythe** was the fifth-best UCT team, having solved 4 problems.

Inconsistent Axioms made history at the IT Challenge programming contest—this is the first time that a team composed entirely of 1st year students wins the overall classification. Very impressive performance indeed! **David Broodryk**, **Andrew McGregor**, **Yaseen Mowzer**, and **Bronson Rudner** will represent UCT at the national finals in August in Johannesburg.

## Award for paper at International Conference on Computational Intelligence

PhD student **Sabre Didi**, from the Department of Computer Science, received the Best Student Paper Runner up Award at the Symposium Series on Computational Intelligence (SSCI) held in Athens, Greece. Sabre, with his PhD supervisor **Dr Geoff Nitschke**, investigated the impact of coupling transfer learning with behaviour diversity methods on controller evolution in multi-robot tasks.

## Undergrad student publishes in top science journal

**Hannah Simon**, currently an honours student in Biological Sciences, broke rare ground when she had an article about the tension between social and environmental justice published in the *South African Journal of Science* (SAJS) late last year. All the more impressive is the fact that Simon was a third-year undergraduate student, studying Biological and Environmental & Geographical Science, when the paper was published. The paper is titled “Understanding the polarisation of environmental and social activism in South Africa”.

In countries like Bolivia, policies that simultaneously uplift the people and the planet are put in place. Simon's paper argues that this is often not the case in South Africa, where there is a clear disconnect between social and environmental activism. But it should be possible, in theory. “Given the turbulent socio-economic past in our country, social upliftment is often pursued at the expense of the environment,” she says. She offers three main reasons for this: “Firstly, social change can operate more quickly than environmental intervention can. Secondly, environmental issues are often more obscure than social solutions, and lastly, elements of South African culture may oppose environmental conservation.”

Simon hopes that her paper will encourage scientists and policymakers to design innovative solutions to the country's “unique” socio-ecological challenges. “Being published in the SAJS was humbling, yet incredibly encouraging. The world of academia is daunting for young scientists but I have learned that there are spaces out there, like SAJS, that welcome our works and our opinions,” she said.



# STAFF NEWS

## WELCOME TO NEW STAFF

### Department of Astronomy

- Dr Joseph Bochenek—Senior Data Scientist (IDIA)

### Department of Archaeology

- Mr Mervin Kanye—Departmental Assistant

### Department of Biological Sciences

- Mr Bongani Tom—Departmental Assistant

### Department of Chemistry

- Ms Jessica Akester—Scientific Officer
- Mr Mokhitli Morake—Scientific Officer
- Dr Vinayak Singh—Lecturer (H3D)

### Department of Computer Science

- Mr Aslam Safla—Lecturer

### Department of Mathematics & Applied Mathematics

- Dr Julien Larena—Senior Lecturer
- Mr Thando Mobo—Departmental Assistant

### Department of Molecular & Cell Biology

- Mr Andrew August—Laboratory Assistant
- Mr Khanya Makalima—Departmental Assistant
- Mrs Sandisiwe Mzuzu—Departmental Assistant

### Department of Oceanography

- Dr Katye Altieri—Lecturer

### Department of Physics

- Dr Katie Cole—Lecturer
- Dr Nawahl Razak—Scientific Officer

### Department of Statistical Sciences

- Mr Etienne Pienaar—Lecturer
- Mr Melusi Mavuso—Lecturer
- Mr Mzabalazo Ngwenya—Lecturer

## New Staff Profiles:



**Dr Katye Altieri**, Department of Oceanography, has a BSc in Chemistry from a university in the USA. Katye wanted to do applied chemistry, so she pursued a PhD in Oceanography, with a focus on atmospheric chemistry, at Rutgers University's Institute of Marine & Coastal Science. As a PhD student she conducted laboratory experiments simulating the organic radical chemistry that occurs in cloud waters. After her PhD, she was a US National Oceanic & Atmospheric Administration Climate and Global Change Fellow, jointly appointed between Brown and Princeton Universities. During her post-doc, she conducted a two-year field campaign on the island of Bermuda, studying atmospheric nitrogen cycling between the surface ocean and lower atmosphere. An avid student, she then did a Master's degree in Public Policy at Princeton University, with a focus on development. Subsequently, she came to South Africa, to the Energy Research Centre at UCT and now to the Department of Oceanography.



**Aslam Safla**, Department of Computer Science, joined UCT from UKZN, Pietermaritzburg, where he fulfilled various academic roles for 16 years. He enjoys teaching and developing student interest in Computer Science, for example, through the use of teaching robots.

**Mzabalazo Ngwenya**, Department of Statistical Sciences, was born and raised in Swaziland where he obtained his undergraduate degree. Being passionate about numbers and the environment lead him to study Statistics and Geography, Environmental Science & Planning (GEP) for his bachelor's degree at the University of Swaziland (UNISWA). In 2006 he moved to Cape Town to pursue postgraduate studies in the Department of Statistical Sciences at UCT. His Masters research focused on kriging, a statistical technique widely used in the earth and environmental sciences. After completing his Master's degree, he moved to Stellenbosch where he worked as a biometrician at the Agricultural Research Council (ARC). He is happy to return to UCT as a Lecturer in Statistical Sciences.



## FAREWELL TO STAFF

### Department of Astronomy

- Ms Bianca Kuck

### Department of Biological Sciences

- Ms Daphne Meyer
- Ms Ellenor Salo

### Department of Chemistry

- Mr Gianpiero Benincasa
- Mr Edmore Kativu (H3D)

### Department of Computer Science

- Mrs Eve Gill

### Department of Mathematics & Applied Mathematics

- Ms Tania Jansen

### Department of Molecular & Cell Biology

- Ms Mietah Andreas

### Department of Physics

- Mr Khayaletu Salman

### Department of Statistical Sciences

- Associate Professor Christien Thiar



**Julien Larena**, Department of Mathematics & Applied Mathematics, came from France to South Africa in 2008, after graduating with a PhD in theoretical physics from the University of Paris-Diderot. He spent 3 years as a Claude Leon postdoctoral fellow at UCT, before taking an appointment in the Department of Mathematics at Rhodes University.

After 6 years at Rhodes University, he has returned to UCT, to start as a Senior Lecturer in the Department of Mathematics & Applied Mathematics. He is a theoretical cosmologist, who studies the formation of large-scale structures in the Universe and their impact on cosmological observables, with a particular emphasis on general relativistic effects.



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## Promotions in the Faculty:

Congratulations to the following staff for their *ad hominem* promotions, effective in 2017.

Department	Title	Name	Promoted to
Archaeology	Dr	Deano Stynder	Senior Lecturer
Biological Sciences	Dr	Adam West	Associate Professor
Biological Sciences	Dr	Samson Chimphango	Senior Lecturer
Chemistry	Dr	Gerhard Venter	Senior Lecturer
Enviro & Geog Science	Dr	Frank Eckhardt	Associate Professor
Geological Sciences	Ms	Fayrooza Rawoot	Chief Scientific Officer
Mathematics & Applied Maths	Dr	Jonathan Shock	Senior Lecturer
Mathematics & Applied Maths	Dr	Haris Skokos	Associate Professor
Mathematics & Applied Maths	Ms	Mariola Kirova	Senior Lecturer
Mathematics & Applied Maths	Mr	Thomas van Heerden	Senior Lecturer
Molecular & Cell Biology	Ms	Marilyn Krige	Chief Scientific Officer
Molecular & Cell Biology	Ms	Keren Cooper	Chief Scientific Officer
Statistical Sciences	Dr	Sheetal Silal	Senior Lecturer
Statistical Sciences	Mr	Alan Clark	Senior Lecturer

## New Staff Profiles continued..

**Etienne Pienaar**, Department of Statistical Sciences, has lived in Johannesburg for most of his life, and enjoys hanging out with friends and his girlfriend, running with his jogging buddy, Watson, (a Labrador of roughly equal intelligence to the Sherlock Holmes character from whom he was named), making music, and occasionally spending time in the engine bay of a broken BMW - fortunately, not his own. He obtained a BSc in Financial Mathematics at the University of Johannesburg and subsequently completed a Postgraduate Diploma in Actuarial Science and an Honours in Statistics at UCT. He then enrolled for a Master's and then a PhD in Statistics.



Although his research focuses primarily on the analysis of non-linear jump diffusion processes and the development of computationally efficient techniques (and accompanying software packages) to do so, he has strong interests in machine learning and risk valuation for financial instruments.

**Melusi Mavuso**, Department of Statistical Science, grew up in Mbabane, Swaziland where he completed his schooling. He then did a BSc degree at UCT, majoring in Mathematics, Statistics, and Actuarial Science and proceeded to do his honours in Mathematics. He has since completed a Master's degree in Mathematical Finance and another one in Pure Mathematics, while lecturing in the Statistics department.

He is primarily interested in the applications of mathematical techniques to the hedging of financial instruments in incomplete markets. His other areas of interest include: The Calculus of Variations, Probability Theory, and Machine Learning.

**Dr Vinayak Singh**, H3D, is an experimental biologist. He has an MSc in Biotechnology and a PhD in Biochemistry and has 12 years of extensive research experience. Vinayak's skills as a microbiologist with expertise in antimicrobial drug discovery and development, developed during his time at the CSIR-Central Drug Research Institute in Lucknow, India, where he completed a PhD degree in Biochemistry. Next, he joined UCT, where he worked as a post-doctoral fellow in the laboratory of Prof. Valerie Mizrahi. His main interest lies in: (i) what makes *Mycobacterium tuberculosis* a slow grower, and (ii) deconvolution of mechanism of action of potential anti-TB compounds - to fulfill a broad and acute interest in the discovery of new innovative drugs.



**Dr Katie Cole**, Department of Physics, is an applied physicist from the North-East of the United Kingdom. She completed her PhD at Imperial College London.



Her research focuses on using physics to explain the fundamental behaviour of foams, froths and other soft matter systems, particularly where it can enhance the efficiency of industrial processes and reduce environmental impact. Her experimental research takes place at PEPT Cape Town which is a facility managed by the UCT Department of Physics at iThemba LABS.

As a physics teacher, her main goal is help students understand that physics is part of a greater web of Science, especially in real world applications.

## Sharing research on a massive scale—Professor Anusuya Chinsamy-Turan goes global with her MOOC Extinctions: Past and Present.

**Professor Anusuya Chinsamy-Turan**, whose research interests lie in palaeo biology and specifically fossil bones (including those of dinosaurs), is an enthusiastic communicator of science. This led to her creating a MOOC (Massive Open Online Course) to share her work with people across the world. Extinctions: Past and Present is the free online course she created, which piloted in March and will run again in June 2017. “My research is immensely satisfying, but sharing it with the wider public is even more so...in addition to the work that is essential for progressing in an academic career, and despite the lack of clear professional rewards for communicating with the public, I have always felt a deep commitment to spreading the joy of science”, says Anusuya.



The free five week online course takes participants on a journey of exploring how life on Earth has been shaped by five mass extinction events in the distant past and examines how biodiversity is facing a crisis, with the prospect of a sixth extinction event today. Professor Chinsamy-Turan interviews guest scientists about how their research informs us about the biodiversity of the planet, including the very first life forms; fish and tetrapod diversification; the radiation of reptiles and dinosaurs; and the rise of mammals. During the course, there is an opportunity to ‘eavesdrop’ on interesting conversations between Anusuya and 15 scientists, including **William Bond, Ed Rybicki, Peter Ryan, Muthama Muasya, Becky Ackermann, Lindsey Gillson** and **Timm Hoffman**, from the Science faculty.

Over 3300 participants from 120 countries around the world signed up for the first run of the MOOC Extinctions: Past and Present. The top number of participants signed up from the UK and South Africa, followed by the USA, Australia, India, Mexico, Canada and Brazil. The participants ranged from highly qualified professionals learning alongside post-graduates, teachers, grandparents and school learners. Many enrolled for general interest and enjoyment as well as sharing a concern for understanding human impact on biodiversity. One participant’s course feedback read: “Life on Earth in five weeks. From green algae to humans. Absolutely brilliant course. The rise and fall of dinosaurs. Mass extinctions. Asteroid strike.”

The course will run again on 19th June, with another one running on 4th September—so sign up and be part of this exciting experience!

## Science shines at inaugural UCT PhD 3 Minute talk competition.

Nineteen PhD researchers recently stood up in front of an audience and panel of judges, to condense years of research, culminating in a roughly 80,000 word thesis, into a three-minute oral presentation. They were competitors in UCT’s first Three Minute Thesis (3MT®) competition.

A winner and runners-up in two categories – Science & Engineering and Social Sciences & Humanities – were announced after a riveting two hours of presentations. The contestants said that the event offers so much more than just a prize.

Science outshone other faculties and claimed all the prizes in the Science, Engineering and Technology (SET) section of the inaugural 3MT talk competition.

“Scientists tend to huddle in their own research communities and never tell other people what they’re doing. 3MT highlights the importance and impact of communication,” says the winner of the Science category, **Kerryn Warren**, from the Department of Archaeology.

The winners were:

- **Kerryn Warren** - 1st Prize Winner - Department of Archaeology
- **Isobel Kolbe** - Runner-up (SET) - Department of Physics
- **Elias Aydi** - Overall People's choice winner (both Science and Social Sciences) - Department of Astronomy



*Science Post Grad Student Committee with Science winners: L to R: Elias Aydi, Sabina Omar (PRO), Isobel Kolbe, Kerryn Warren, Temitope Egbebiyi (Chair) & Roxanne Openshaw (Deputy Chair)*

**Kerryn Warren** then went through to the National competition where she won the first prize—congratulations Kerryn—we are proud of having such excellent Science communicators!

*The two national winners: Andrew Verrijdt (Social Sciences & Humanities, UCT), Professor Peter Meissner and Kerryn Warren*





## Research Bytes

### Dolphins identified by their whistles

Have you ever noticed a subtle difference between dolphins' whistles? According to new research by a team of researchers, including **Dr Tess Gridley** of the Department of Statistical Sciences, there are differences. The researchers used state-of-the-art software to distinguish dolphin calls so clearly that particular species could be identified based solely on their whistles.



This technology – passive acoustic monitoring (PAM) – is used frequently across the globe, but until recently has not been applied on a mass scale to dolphins in southern African waters. Gridley, along with Florence Erbs of Sea Search Africa and Dr Simon Elwen of the University of Pretoria, employed a software package called PAMGuard to identify three dolphin species that are often found along the southern African coastline. Of particular interest was how well PAMGuard could correctly distinguish between *Tursiops aduncus* and *Tursiops truncatus* – more commonly known as the Indo-Pacific bottlenose dolphin and the common bottlenose dolphin. These two closely related species are notoriously difficult to identify from field observations. A third species, the short-beaked common dolphin (*Delphinus delphis*), was also examined.

#### How accurate was the whistle detection?

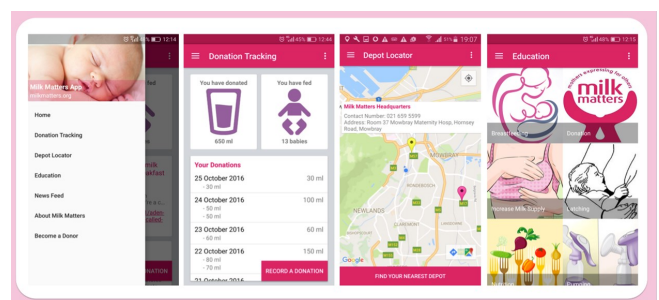
Their results were excellent - the overall mean classification success rate with PAMGuard was 87.3% for all three species. The Indo-Pacific bottlenoses' whistles were classified most successfully, with a hit rate of 96.3%. Short-beaked dolphins were correctly classified in 87.6% of cases, but their whistles were mistaken for those of the common bottlenose in 12.9% of cases. Common bottlenoses had the lowest accuracy of 79%. Misclassification with short-beaked dolphins was frequent at 19.4%, but they were rarely (1.6%) mistaken for the Indo-Pacific bottlenose.

#### Geographic variation in whistle characteristics

The researchers tracked dolphins in Plettenberg Bay, Walvis Bay (in Namibia) and Zanzibar, and encountered the whistling dolphins some 87 times during the study period. "Our study represents a rare attempt to quantify the impact of intra-specific geographic variation in whistle characteristics on species classification results," they wrote. Because, for instance, Zanzibar's common bottlenose dolphins were so acoustically distinct from the South African populations, people trained to identify the Zanzibar mammals were more likely to misclassify the whistles they heard in South African waters. PAMGuard's fully automated whistle detection software makes it possible to track species at night or when the weather is poor, boosting the archive with basic data on call repertoire and vocal characteristics of local dolphins is crucial. This study gives a glimpse of what is possible in terms of monitoring species that frequent the waters off southern Africa's shores, using passive acoustic methods.

### Milk Matters—an app built for mothers to track their donations, discover nearby depot locations and read relevant educational content centred around donation and breastfeeding.

The Milk Matters Mobile Application, which provides breast milk donation and breastfeeding content to mothers, in particular, Milk Matters' donor mothers, was developed in conjunction with Milk Matters and their donors as part of **Chelsea-Joy Wardle** and **Mitchell Green's** Honours project in the Department of Computer Science, supervised by **Dr Melissa Densmore**.



The easy-to-use app is designed to be useful, informative and fun for users, by providing them with tools and content based around the breastfeeding and donation processes. Available from the Google Playstore, this is the must-have app for mothers who are currently or intend to become milk donors for Milk Matters!

The features and functionality provided by the application (as seen above) include: a donation tracker, educational content, news and events feed, and an "about Milk Matters" section. Registered donor mothers are also able to access a depot locator, which provides them with a map of Milk Matters' depots, and key information about each depot.

You can download the app from <https://play.google.com/store/apps/details>

## African elephants may transport seeds farther than any other land animal.

The African savanna elephant, the largest living terrestrial animal, now appears to be the longest distance transporter of seeds. New research into elephant dung in South Africa, by UCT MSc student **Katherine Bunney** and Emeritus Professor **William Bond**, from the Department of Biological Sciences, indicates that elephants can transport seeds up to 65 kilometers, which is 30 times farther than savanna birds take seeds. This finding indicates that elephants play a significant role in maintaining the genetic diversity of trees on the savanna and are critical to the integrity of the African savanna ecosystems. Plants make fruit to encourage animals to eat and then move their seeds to new locations. Not only does this help expand the plant population, it also prevents seedlings from competing with their parents or suffering from any pathogens that may have accumulated in their home turf. Seeds lucky enough to be eaten by a large animal drop onto their new habitat encased in a big lump of nutrients. For some species, passing through the digestive tract of an animal increases the percentage of seeds that sprout. There seem to be other benefits as well; elephant dung for example, somehow protects seeds from predation by beetles.



Katherine Bunney became interested in the role of elephants in moving seeds while a graduate student in ecology in the Department of Biological Sciences. She had read about large fruit in Central and South American forests that falls to the ground and rots because it evolved to be eaten by large herbivores, now extinct. "I thought, 'How lucky we are to still have ours,'" she says. "I wanted to start exploring what they do." Studies in Asia and Africa have shown that forest elephants consume a large amount and diversity of fruit and spread the seeds, but little research had been done on seed dispersal by savanna elephants. The first thing that Bunney needed to know, was how long seeds stay inside elephants while winding through their 20-meter-long intestines. For a week, she fed fruit to four elephants in a sanctuary near the Kruger National Park in South Africa. She gave them honeydew melons because their smaller, softer seeds are relatively easy to distinguish from the seeds of the tree fruit the elephants were already eating. Keepers followed each elephant during the day, bagging the dung and bringing it back to Bunney, who sorted through hundreds of kilograms and counted the melon seeds. The elephants, she found, defecated most of the seeds within 33 hours, while the last ones plopped out after 96 hours.



*Kath Bunney sorts through elephant dung*

Among seed dispersers on the savanna, elephants are the champs in how far they can move seeds. Globally, migratory birds top the list. The next step was to find out how far savanna elephants typically move. Bunney approached a conservation group called Elephants Alive that has put collars with tracking devices on elephants in Greater Kruger National Park. With 8 years of data on 38 elephants, Bunney calculated the probability of seeds being moved various distances. For any given fruit, an elephant would move half the seeds 2.5 kilometers from where they were eaten, and 1% of seeds would move farther than 20 kilometres. In extreme cases a seed could travel up to 65 kilometers, such as when male elephants take long treks searching for a mate.

## isiZulu Spellchecker developed by Computer Science

A collaborative effort resulted in an isiZulu spellchecker being launched late last year at the UKZN isiZulu Books and Human Language Technologies event. The spellchecker is a culmination of research and development of a Computer Science Honours project by **Balone Ndaba**, supervised by **Professor Hussein Suleman** and **Dr Maria Keet** in the Department of Computer Science, which was turned into a user-usable app by 3rd year Computer Science student **Norman Pilusa**. It is currently the only functioning spellchecker for isiZulu.

This spellchecker has as distinguishing feature in that it is data-driven with a statistical language model as the back-end. The isiZulu National Corpus from UKZN was used to train the model, which takes all those words and computes the tri-grams (e.g., *yebo* is split into *yeb* and *ebo*) and their probability of occurring is then calculated. Unusual successive characters are detected as very probably incorrect, resulting in the word being flagged as misspelled. The user can correct this or add the word to the dictionary.



*Dr Maria Keet, Mr. Norman Pilusa and Dr. Langa Khumalo (Director of the ULPDO at UKZN)*

## Meteorites from Mars by Dr Geoff Howarth

**Dr Geoffrey Howarth**, from the Department of Geological Sciences, has been doing ongoing research focused on the use of meteorites that are interpreted to be derived from Mars. These meteorites are all volcanic in origin and are quite similar to rocks from Earth called basalts. They formed on Mars over a large range in ages from several billion years ago to significantly younger ages of 100 million years ago. While this may also sound pretty old, 100 million is relatively young in a geological sense. By analysing these meteorites, they are able to broadly constrain the magmatic evolution of Mars, and in so doing, the evolution of the martian mantle, over billions of years.



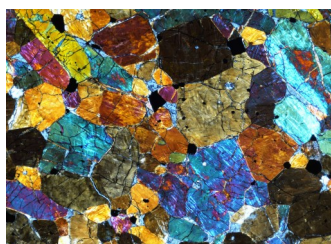
Dr Geoffrey Howarth

### How many are there?

These meteorites are extremely rare and until 1977 there were only six known specimens that were recognized as Martian meteorites. Today the number of separate Martian meteorites is about 107. Most of these have been found in Northwest Africa, which is one of the most significant sources of meteorites. In order to get a piece of Mars off the planet, there must have been large impact events on Mars, which then eject material off the planet into space. These fragments of Mars float around in space for several million years before intersecting Earth and falling to the surface of Earth as meteorites.

### How big are they?

The largest Martian meteorite is Zagami at 18.0 kg and the smallest unpaired Martian meteorites are Grove Mountains 020090 (7.5 grams).



Microscope image of meteorite rocks under microscope

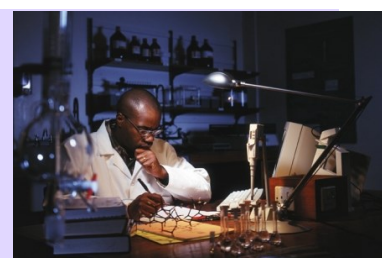
### Where are they found? And by whom?

Annual expeditions to Antarctica since 1975 by Japanese, USA, and more recently Chinese government-sponsored teams, have resulted in a steady increase in the number of Martian specimens. The first Antarctic Martian meteorite was found on 29 December 1977, the second one in 1979, and the most recent one in January 2012. Additionally, in the late 1990s exploration of the rocky deserts of Northwest Africa and Oman (supported largely by private collectors) led to a dramatic increase in recovered specimens, that still has not abated. In fact, over half (62%) of all Martian meteorites found since 1975 are from Algeria, Morocco and adjacent regions; one is from Libya and four are from Oman. Although most meteorites must fall in the ocean, there can be no doubt that Martian me-

eteorites have fallen on land everywhere, if only we could recognize them in forested or urban areas. There are other rocky deserts (for example, in Australia, Mongolia and the western USA) that would be fruitful places to search. Given the success of nomads in Northwest Africa and others in Oman, it must be concluded that future discoveries elsewhere are limited mainly by insufficient effort. Let's get going!

## New antimalarial drug shows promise

A new paper published recently in the prestigious journal *Science Translational Medicine* describes the discovery and biological profiling of an exciting new antimalarial clinical drug candidate. MMV390048 is effective against resistant strains of the malaria parasite and across the entire parasite life cycle, and it has the potential to cure and protect in a single dose. The research was conducted by UCT's Drug Discovery and Development Centre (H3D) and Medicines for Malaria Venture (MMV), in collaboration with a team of international researchers.

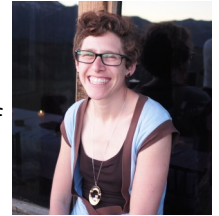


The compound was discovered by an international team led by **Professor Kelly Chibale** from H3D. "The ability of MMV048 to block all life-cycle stages of the malaria parasite, offer protection against infection as well as potentially block transmission of the parasite from person to person, suggests that this compound could contribute to the eradication of malaria, a disease that claims the lives of several hundred thousand people every year," said Professor Chibale, senior author of the paper. In 2014 MMV048 became the first new antimalarial medicine to enter phase I human studies in Africa. Today, preparations are being made to begin phase IIa human trials on this promising compound as a single-dose cure. "This compound has enormous potential," said Dr David Reddy, MMV's CEO. "In addition to the exciting characteristics noted, it has the potential to be administered as a single dose, which could revolutionise the treatment of malaria. At MMV, we look forward to continuing our work in partnership with Professor Chibale and colleagues at UCT to pursue the development of this and future next-generation antimalarials."



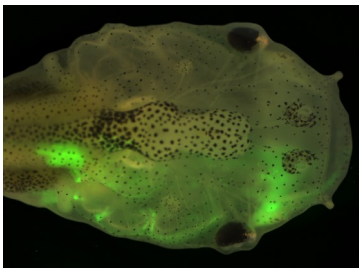
## New light shed on evolution of carotid body cells

**Dr Dorit Hockman**, (pictured right), a Sydney Brenner Postdoc research fellow in the Department of Molecular & Cell Biology is doing research in Dr Clare Baker's laboratory at the University of Cambridge, which focuses on the evolution of the oxygen sensitive cells of the carotid bodies and this research was recently published in the journal *eLife*.



The carotid bodies are the small glands found on either side of our necks, near the carotid artery. When the oxygen levels in our blood drop, such as at high altitudes, these cells signal to the brain to activate hyperventilation and increase our heart rate, so that more oxygen is delivered to our cells. The carotid bodies are often compared to similar oxygen-sensitive cells found in fish gills, known as neuroepithelial cells. In fish, these cells detect changes in the oxygen levels in the surrounding water and in their blood. It has been suggested that when the ancestral vertebrates moved from the oceans onto land, the neuroepithelial cells found in the gills gave rise to the oxygen-sensing cells of the carotid bodies. The carotid body develops from 'neural crest' cells, which give rise to many tissues, including nerve cells. Dorit and her collaborators asked if neuroepithelial cells are also neural crest-derived.

The research team labelled neural crest cells in lamprey, zebrafish and frog embryos, using techniques such as injection with fluorescent dye or genetic modification so that the neural crest cells produce fluorescent proteins. To their surprise, the fluorescent dyes/proteins never labelled the neuroepithelial cells in the gills. Instead, these cells originated directly from the lining of the mouth and gills. Furthermore, their patterns of gene activity were different from the carotid body. They concluded that the carotid body did not evolve from ancestral fish neuroepithelial cells. Instead, they suggest that the neuroepithelial cells are related to oxygen-sensitive cells in the lungs.



*As an embryo, this tadpole received a neural crest tissue graft on its right side from a Green Fluorescent Protein transgenic donor embryo. As a result, the neural crest-derived structures, such as the jaws, glow green on only one side of its head.*

## How did climate change affect early humans?

How and to what extent did climate change in the past impact early humans and how did early humans adapt to new environments? The North of Kuruman Project, led by **Dr Jayne Wilkins**, Department of Archaeology, and **Dr Benjamin Schoville**, Centre of Excellence in Palaeosciences Postdoctoral Fellow, is a interdisciplinary investigation of early human adaption in the Kalahari Basin, designed to address those questions. This new project will help identify the important drivers behind the origins of *Homo sapiens* by focusing on a region that has received little archaeological attention to date.

The North of Kuruman project was recently awarded funding from the National Geographic Society-Waitt Foundation, which targets social sciences projects at the cutting edge of technology and exploratory research. Last year the group discovered new Middle Stone Age deposits at an archaeological site called Gamohana Hill near Kuruman in the Northern Cape and they are going back in July this year for additional excavation and survey. Dr Wilkins will take 10 of her students to the site to learn new skills in archaeological excavation and survey and three Master's students, **Simangaliso Makalima**, **Khumo Matlhoko** and **Alyssa Eltzholtz** are doing their research on aspects of this project.



*Team photo at Gamohana Hill*



*Gamohana Hill North Rockshelter where new Middle Stone Age deposits were discovered*

## Scampering, trotting, walking tridactyl bipedal dinosaurs in Lesotho

**Miengah Abrahams**, an MSc student in the Department of Geological Sciences, together with **Dr Emese Bordy**, recently published in an international journal of paleobiology, on dinosaur trackways in Lesotho. In Gondwana, Early Jurassic dinosaur track sites are especially concentrated in Lesotho, however, despite intensive investigations during the third quarter of the twentieth century, only a limited number of these vertebrate track sites were studied with rigorous ichnological and sedimentological methods. (Ichnology is a branch of geosciences that bridges sedimentology & palaeontology and studies the traces left behind by organisms in sediments. Such fossil tracks can provide unique insights into an animal's behaviour).



*Palaeoenvironmental snapshot of the track-bearing surface at the Lephoto dam site showing some of the trackways made by two different tridactyl bipedal trackmakers that walked near the shoreline of a shallow desiccating pond.*

In this paper, a previously undescribed track site in Lesotho, is presented. Fifty-two individual tridactyl tracks were found on the Lephoto palaeosurface, which were generated by three-toed bipedal dinosaurs (tridactyl bipeds) that moved towards or away from the shoreline of a shallow pond. Two track morphologies were recognised. The first is identified as *Grallator*-like, an ichnotaxon common in the Lower Jurassic of both Laurasia and Gondwana that can be attributed to small and medium-size carnivorous theropod dinosaurs. The second ichnotaxon is reminiscent of *Trisauropodiscus*, which, in contrast, is a rare ichnotaxon that resembles tracks of birds and is known with certainty from only a few places in the world.

Their work provides further evidence that the ichnological record of the Elliot Formation of southern Africa is in a unique position to shed light not only on Early Jurassic biostratigraphy and palaeoenvironments but also on the biodiversity and palaeobiology of early dinosaurs. They reconstructed the behaviour of the various tridactyl bipedal trackmakers in terms of locomotion speed. The gait analysis of the five trackway makers at the site range from a walking gait to a running gait. While it is established that larger theropods walked more slowly than smaller theropods, this is not directly observed at the Lephoto dam site. The largest trackmaker is more than three times the size of the smallest trackmaker but both have similar gaits and speeds.

In summary, the Lephoto tracksite preserves a snapshot into life some 200 million year ago. The area was very active with small and medium sized dinosaurs, of different species, walking, trotting and running across a 4m<sup>2</sup> area of saturated sand, perhaps heading to a nearby water source. In addition to the vertebrate track traces, invertebrate worm-like trails are preserved throughout the surface. Pitted surface textures suggest that microbial algal mats, which were formed by micro-organisms exploiting the wet conditions, aided in preserving these shallow track impressions.

Amazing what a set of footprints in sandstone can tell about dinosaurs and the land they walked on!

## Travels across the globe....



## UCT-Spain Erasmus+ agreement for Postgraduate students and staff

**Professor Peter Dunsby** and **Dr Alvaro de la Cruz Dombriz**, from the Department of Mathematics & Applied Mathematics, have, together with the International Academic Programmes Office (IAPO) and Alliance4Universities (A4USpain), established and signed a Mobility Exchange programme Erasmus+ (European Union) between UCT and A4U Universities.

To date, several staff members, Master's and PhD students have benefitted from the programme and spend either one week (staff members) or up to five months (Master's and PhD students) doing teaching mobility internships or research visits, respectively. Four UCT Masters and PhD students have done internships and research visits at the prestigious Theoretical Physics Institute this semester.

## Geologists visit Northern Chile by Chris Harris

**Dr Petrus le Roux** and **Professor Chris Harris** from the Department of Geological Sciences recently spent three weeks in northern Chile presenting a week-long course on isotope geochemistry to post-graduate students at the Universidad Catolica del Norte (UCN) in Antofagasta. We were hosted by former UCT PhD graduate Andrew Menzies, now on the staff of UCN. Anybody who thinks that Cape Town is undergoing a drought should visit Antofagasta, where it has not rained for several years. As a result, there is no vegetation, no insects, or any other signs of life. Massive desalination plants, pipelines carrying seawater inland, and tankers carrying drinking water may be the sign of things to come in the Western Cape. After the teaching, 10 days were spent in the field sampling volcanoes as part of a joint UCN-UCT project that is trying to determine the relative contributions of the Earth's crust and mantle to the magmas responsible for the volcanic activity. These are all active volcanoes and many are producing steam and other gases. The drive from Antofagasta to our campsite at 3900 m at the base of Volcan San Pedro took about 4 hours and we suddenly found ourselves putting up tents while very cold and out of breath. Fieldwork as high at 4900 m required a fair amount of effort, especially for the older members of our group of ten. Six of our group were Chilean post-graduates, and the UCT contribution to their theses will be stable and radiogenic isotope data. The absence of any insects and the coldness of the beer more than made up for the problems of working at altitude. Occasional rain and snow meant that there was some vegetation as well as vicuna and guanaco running around.



*Harris, le Roux and Andrew Menzies with Volcans San Pablo and San Pedro in the background (both over 6000 m). Photos :Andrew Menzies.*



*Harris and le Roux with the Salar de Carcote and Volcan Ollague in the background*

After 4 days camping we moved to San Pedro de Atacama, a tourist centre 100km to the SW to sample more volcanoes. The archaeology department of UCN is based here and we got a chance to look at wonderfully preserved 1000 year old wooden artefacts from pre-Inca civilizations. We were also able to visit the Tulan archaeological site on our return trip to Antofagasta. Discussions were held with the UCN archaeologists on the possibility of a collaborative project, using isotopes to determine the source of turquoise found at the site. In addition to the amazing volcanic geology, the area hosts large number of ore deposits (copper, silver, gold), as well as unique nitrate, boron and lithium deposits associated with the strongly evaporative environment.

## PCU attends Cape Floristic Region Biodiversity Workshop

In January 2017, a group of researchers interested in the biodiversity and environmental change of the Cape Floristic Region attended a workshop in Stellenbosch. The event was organised and facilitated by **Associate Professor Lindsey Gillson**, Deputy Director of the Plant Conservation Unit (PCU). The purpose of the workshop was to reflect on past research and to brainstorm ideas for future research collaboration within the UCT Department of Biological Sciences, as well as with other organisations such as SANParks, SAEON, the University of Stellenbosch, and WITS University.



*Researchers hiking through a stand of Protea nitida*



*Prof Timm Hoffman illustrating that the Reserve has potential for a repeat photography project*

The day began with a field trip to Jonkershoek Nature Reserve, where the group was fortunate to visit three sites which showcased the effects of past fires and pine plantations on the hydrology and ecology of the landscape. Conservation-related investigations have been explored in the Reserve since the late 1800s and the area has a long historical record of past land-use, including hydrological experiments which were conducted to investigate the effects of pine plantations on water availability. Staff and students from Biological Sciences presented talks and facilitated discussion groups on the Soils Atlas project, the Focal Sites project, the Evidence-based Conservation project and the Seasonality project. The hope is to have a synthesis workshop once all projects have been completed and to encourage the continuation of such collaborative efforts in the future.



## Antarctica Adventure: Floating around Antarctica for three months

Three UCT scientists. **Professor Peter Ryan** from the Percy FitzPatrick Institute, and **Dr Sarah Fawcett** and postgraduate student **Heather Forrer** from the Department of Oceanography, jumped at the chance to join one of the biggest and most ambitious scientific expeditions in history. The Antarctic Circumnavigation Expedition (ACE) drew dozens of scientists from around the world and swung them round Antarctica on the Russian research vessel *Akademik Treshnikov*. The goal was to see first-hand, through a broad range of scientific disciplines, what impact climate change is having on the Southern Ocean and what it means for us landlubbers.



Ryan, an ornithologist, not only spotted a pleasing abundance of birds and whales, but a disturbing density of synthetic microfibres in the waters around Antarctica. There was little other debris floating about and Ryan believes that the origin of the fibres could be washing machine waste water. “The sea is the ultimate sink for anything that goes into the environment,” said Ryan. “This, of course, heightens fears that marine creatures will ingest these synthetic fibres”, said Fawcett.

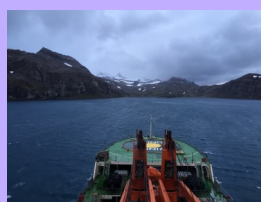
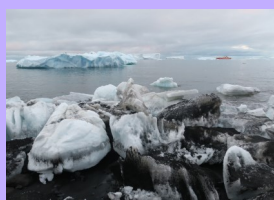
### Once-in-a-lifetime adventure

ACE was the brainchild of Frederik Paulsen, a reclusive pharma billionaire, philanthropist and the first person in the world to have attained all eight poles. In late 2015 scientists around the world were invited to propose research projects for a first-of-its-kind circumnavigation of Antarctica, as the first project of the newly created Swiss Polar Institute. The *Akademik Treshnikov* set sail from Cape Town on 20 December 2016 on the first of the three legs of its circumpolar voyage.

For Forrer, befriending scientists from all over the world was just one of the reasons the trip was “unforgettable”. That, and as Fawcett reminded her, “You got to land [in] a helicopter on an iceberg!” More than 100 scientists working on 22 projects were jockeying for ship-time throughout the trip.

Heather says, “This trip was spectacular, the raw beauty striking, and it really placed our work and what we were doing on the edge of the Earth into perspective. We were fortunate to visit and sample remote places and have been able to acquire the most incredible data set. We were able to do all this with the most amazing group of people who very quickly turned into family, and hilarity ensued as we bobbed around the Southern Ocean in our beloved ‘Treshy’.

“Boarding the ship, I was an inexperienced, fresh-faced oceanography student. Disembarking the ship, I am still an oceanography student but with a Masters degree in pump maintenance, plumbing, troubleshooting and a renewed appreciation for duct tape and cable-ties”, said Heather Forrer



## BRU features at International Papillomavirus Conference, held in Africa for the first time.

**Professor Ed Rybicki** and **Dr Inga Hitzeroth** of the Biopharming Research Unit (BRU) in the Department of Molecular & Cell Biology were involved in the organisation of the 31st International Papillomavirus Conference (IPVC) held in Cape Town. This is the first time the conference has been to Africa and it attracted more than 1300 delegates from across the world, including 200 from Africa—the largest contingent from the continent at any IPVC in its history.

The theme of the conference was “Basic Science to Global Health Impact” and this was addressed in three parallel streams, namely: Basic Science, Public Health and Clinical Research. The Honourable Mrs Naledi Pandor, South Africa’s Minister of Science and Technology opened the conference and commented that South Africa was the first African country to fund national vaccination against HPV and that South Africa needed to boost their own manufacture of drugs and vaccines.

Professor Rybicki gave an invited Plenary Lecture on “Plant-Made HPV Vaccines: Have They Come of Age?”, Dr Inga Hitzeroth presented a talk on “Plant Made HPV Pseudovirions For Delivery Of Therapeutic Vaccines”, and there were five poster presentations by members of the BRU. The conference

The BRU crew

was an excellent learning experience for students from the BRU, as well as representing a unique opportunity to showcase their work in an international setting.



## Dr Lynne Shannon, lead author for Intergovernmental Science Policy platform on Biodiversity



**Dr Lynne Shannon**, Chief Research Officer in Biological Sciences, was asked to be a lead marine author of a chapter of the Global Assessment of Biodiversity and Ecosystem Services report (Global Assessment of the Intergovernmental Platform on Biodiversity and Ecosystem Services—IPBES). She and a group of 30 natural and social scientists from across the globe, drawing on terrestrial, freshwater and marine expertise in multiple disciplines, recently met at the German Centre for Integrative Biodiversity Research (IDIV) in Leipzig to examine the status and trends in nature, nature's contributions to people and drivers of change. The multi-national, high-level report aims to examine global patterns, develop global maps and be a basis to advise decision-making. It will strive to put things in perspective on regional levels and examine key trends, drivers and characteristics of biomes. As part of their assessment of nature's contributions to people (NCP – the IPBES term for ecosystem services), they will be evaluating the literature demonstrating the production and use of various NCPs in biomes worldwide.

Lynne commented on her experience of meeting up with the team and working with them, "I enjoyed getting to know people from different fields and backgrounds, working as a team I learned so much and enjoyed workshopping ideas to accommodate these different perspectives." She found it interesting to discuss issues such as how to quantify and compare economic versus natural value of biomes and considering the trade-offs of climate change strategies which are not always advantageous to biodiversity. Lynne believes this opportunity of working on the global biodiversity report is important in creating connections and drawing UCT and the work done here, into the international arena.

For more information on the Intergovernmental Platform on Biodiversity and Ecosystem Services see <http://www.ipbes.net>

## A first for the Science Faculty—a visit to Libya by Graham Jackson

**Emeritus Professor Graham Jackson**, from the Department of Chemistry, was recently invited to attend the 2<sup>nd</sup> Libyan Conference on Chemistry and its Applications. He went to the conference with his Postdoc student Dr Ahmed Hammouda, who originally comes from Libya. The theme of the conference was "The role of chemistry in applied research and sustainable development". The conference was attended by approximately 150 delegates, but Professor Jackson was the only western delegate and gave a plenary lecture entitled "*In vitro Studies of Dermal Absorbed Cu(II) Tripeptide Complexes as Potential Anti-inflammatory Drugs for the treatment of rheumatoid arthritis.*"



Prof Jackson with conference delegates

The conference was very interesting and covered allied sciences including pharmacology, medicine and chemical engineering. Having supervised 4 Libyan PhD students I was surprised at the level of English, the medium of the conference, particularly amongst the postgraduate students. After the conference I gave a lecture to postgraduate students at Omar Mukhtar University in Al Bida. It was a general lecture entitled "*Chemistry in Health & Disease: Marvelous and Malevolent Metals*". Interestingly the majority of the students were female. This appears to be common in Libya, which is surprising given the strict Muslim separation of the sexes. The conference outing was to a Greek/Roman/Turkish town and the men and women travelled on different busses. Coming back the women asked if I would travel with them and so I did having a great time – much more lively and friendly than the male bus. They all wanted to know what life was like in SA, how many wives I had, etc. Before going to Libya I was fairly apprehensive about the security situation in the country, but in the end I felt safer than here in Cape Town. Libyans are photo-mad so I must have had selfies with 200 different people, including bus drivers, waiters, etc.



As a result of my trip to Libya, we are going to put together an analytical chemistry training course at UCT for Libya. I have also had numerous enquiries for Libyan students to do their PhD degree at UCT. Libya does not have a PhD program and so their students have to go elsewhere in the world to continue their studies.

Prof Idress, Prof Jackson and Dr Ahmed Hammouda at the Judicial Experience Research Center



## 2017: A Science Odyssey (with apologies to Stanley Kubrick & Arthur C. Clarke)

by Associate Professor David Gammon

One definition of the noun “odyssey” is that it is (1) a long wandering or voyage marked by changes of fortune, (2) an intellectual or spiritual wandering or quest. The word derives from Homer’s *Odyssey*, the story of the 10-year return voyage of Odysseus from the Trojan war. So, a *Science Odyssey* must be an epic journey involving the traversing of both a literal and a scientific landscape, involving an exploration of Science itself and our place in science, and incorporating some wanderings of a metaphysical or spiritual kind. (Watch out for the movie ...)

Such were the grand intentions of our 2017 Science Odyssey, suitably scaled to the realities of limited time and resources, and taking place in the short vacation from 1-5 May, 2017. We have been running a programme over the past 5 years to provide first year Science students at UCT with the opportunity to experience cutting edge science, access to how scientists think, what kind of work they do and a chance to think about their potential role as scientists.



This year we took two groups of about 45 students on three-day excursions to Sutherland in the Northern Cape, home to national and international astronomical facilities like the Southern African Large Telescope (SALT). These students were from across the majors offered in the Science Faculty as we wanted to focus not only on the specifics of the science being done in Sutherland, but also to think through broader aspects of the scientific enterprise. Some of the highlights were a comprehensive tour of SALT, the visitor’s centre at SAAO, under the expert assistance of SAAO scientist and UCT alumnus Dr Lisa Crause, and viewing of the night sky. For most students it was their first view of celestial bodies through a telescope, and the highlight for some was seeing Jupiter and its moons, Saturn with its rings, and our own moon with its craters!

There was much more to the programme than that—with three aspects standing out in terms of overall impact: The first was a series of discussions where students explored their own journey into Science, their experience in the faculty so far and their own world-views and assumptions about life and each other. It is apparent that we have a generation of bright, critical young scientists who are embracing the possibilities and challenges of science with enthusiasm and are open to hearing the views and experiences of others, together with revising and expanding their own views. The second feature of the programme was a discussion around how to improve learning in the Sciences: students had the opportunity to review their progress so far and to re-evaluate their learning strategies. The third feature of the programme was the ‘project’ which the students embarked on to assess the impact of the scientific enterprise on the town of Sutherland itself. The students broke into groups and dispersed through the town to investigate the experiences of residents. They went to the clinic, the high school, local businesses, community centre, bed and breakfast establishment, church, etc. After their visits, the students shared a surprisingly complex picture of life in Sutherland and the extent to which it benefitted, or otherwise, from the scientific activities.

The 2017 Science Odyssey has confirmed that we have outstanding science facilities and science in South Africa, which should be an inspiration to the emerging generation of scientists. It also indicates that there is value in opportunities such as this, for students to step back from the details of their studies, to think about the bigger picture.





## Science Graduates share their experiences at a Science Careers Café.



The Careers Service recently hosted a Science Career Café event. The intention of the event was to give Science students a taste of what Science graduates do in various industries and types of employment. The event featured two time slots, with three topics running concurrently, where panels of graduates told students how they got into their careers, and answered students' questions. The panels were chaired by careers advisors from the Careers Service, who also collaborated with the Science Students Council in coming up with topics.

Topics included, Careers in Big Data, Biotechnology and Pharmaceuticals and biodiversity, careers with Chemistry, bio-chemistry and microbiology, careers with Environmental & Geographical Science and Geology, and a general topic, 'What I did with my science degree'. Not all Science majors were covered, so the intention is to repeat the event on a smaller scale for specific departments during lunchtimes next semester.

Speakers represented a variety of companies including WWF, Biotech Africa, Pharma Dynamics, TFG and Sea Harvest to mention a few. The evening ended with a networking supper, which was kindly sponsored by RCL foods, who also sent a speaker who works in sustainability in their company. All talks were well attended and comments from students who attended, reflect their experiences of the event.



"Just hearing about people's career paths gave me insight into what I can do" - 4<sup>th</sup> year *Genetics and Biochemistry* student.  
 "I enjoyed hearing about real jobs in the industry that I didn't know existed. It opened my eyes to more options than I thought I had" - *Chemistry* 4<sup>th</sup> year student.

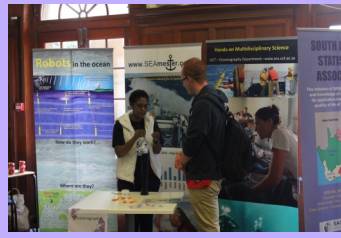
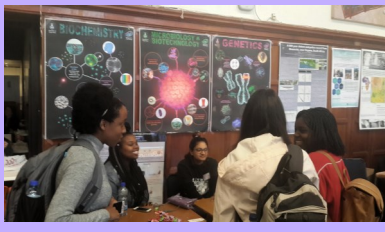


## From Undergraduate to Postgraduate in Science

The Science Postgraduate Student Council (SPSC) spearheaded a new initiative in order to attract more undergraduate students into postgraduate studies in Science. They felt that for many undergraduate students there is insufficient knowledge about what work postgraduate students do and a need for undergraduate students to access relevant information to make informed decisions about postgraduate life. They organised and hosted an all day event in Molly Blackburn on upper campus, to give undergraduate students an opportunity to discover and explore options in postgraduate study in the Faculty. Their aim was to promote and encourage postgraduate studies amongst undergraduates while giving them a more realistic idea of what postgraduate studies involves. Postgraduate students from across all the departments in the faculty volunteered to work at the event, giving personal accounts of what their work entailed, answering questions about funding, application processes, the stresses of being a postgraduate student, services available, etc. The drive of the SPSC was to inspire, but also to foster more adequately prepared future postgraduate students.

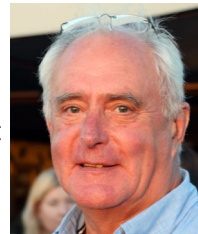
The committee commented, "It was a wonderful day with bright department stalls and approachable, friendly postgraduate volunteers. The undergraduate students walked around and chatted to the postgraduate students with ease. Some students targeted just one department, while others visited quite a few, getting an idea of what each department has to offer. More general questions were asked such as : How do you chose your supervisor?, How do you apply for funding? How many programmes can you apply for?".

The postgrad council received many favourable comments about this initiative and hopes to build on it and grow the event in future years.



## In Memoriam

It is with great sadness that we note the passing of **Associate Professor Mike Lucas**, from the Department of Biological Sciences. Mike has been at UCT since the late 1970's and during this time, many students at undergraduate and postgraduate level have passed through his very capable hands. He started his formal employment at UCT in 1982 as an "Antarctic Officer" involved in deep water marine research funded by the South African Antarctic Programme, before joining the academic staff of the then Department of Zoology. His love of the sea and all things marine biological are well known, and during his time at UCT he enthused many generations of students in the mysteries of the marine world and more recently, the link to climate change. His recent book, co-authored with Mary and Bob Scholes, entitled "Climate Change: briefings from southern Africa" is testament to his deep love for the oceans and their interaction with the climate.



Associate Professor Lucas spent a great deal of his professional life on research cruises in the oceans around South Africa and in the North Atlantic. He helped guide the education and careers of many undergraduates and postgraduates. Many generations were inspired by his lectures in class and on field trips. He will be remembered for his charm and ability to effectively communicate sciences to a wide audience. He will be missed by those who knew and worked with him.

On behalf of the Faculty, we extend sincere condolences to his partner Wendy, his sons Chris and Jonny and his parents, sisters and colleagues in Biological Sciences, on their sad loss, in Mike's final year at UCT before retiring.

## MCB a hive of activity....

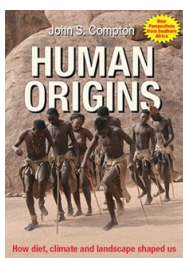
The Department of MCB formed a Transformation Committee to represent all staff and student groupings. This committee has organised talks and discussions on a range of issues.



MCB also held their annual Pub Quiz, alongside which they ran a raffle to win a customized lab coat, to raise money for their Outreach Programme. Some of the other initiatives in the department are: a Green Initiative for recycling and water saving; a hiking group, soccer and an Imzamo Yethu Donation Drive.

*Pictured left is the MCB Honours party with the theme 'Weird Genes' where there is a dance off between students and staff.*

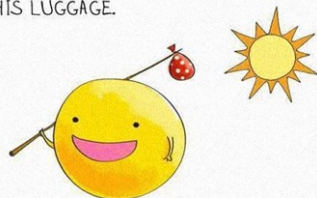
## Recently published:



**Professor John Compton** from the Department of Geological Sciences, recently published a book on 'Human Origins' which is accessible to a broad audience. The book reflects his good public communication of science. Obviously Africa has a very important place in this story, and one of the arguments made in the book is that the Cape and Southern shoreline of Africa may have played a really important role in our species evolution. A wonderful portrayal of 'afrocentric science' on a topic that commands public interest.

## Last Laugh...

A PHOTON CHECKS INTO A HOTEL AND IS ASKED IF HE NEEDS ANY HELP WITH HIS LUGGAGE.



"NO, I'M TRAVELLING LIGHT."

### IF SCIENTISTS HAD LOGOS

Newt n

Gali eo



mc<sup>2</sup>instein

DARWIN



rchimedes  
A

PYTHAGORAS

Tesla

FORMALDEHYDE

CASUAL-DEHYDE

