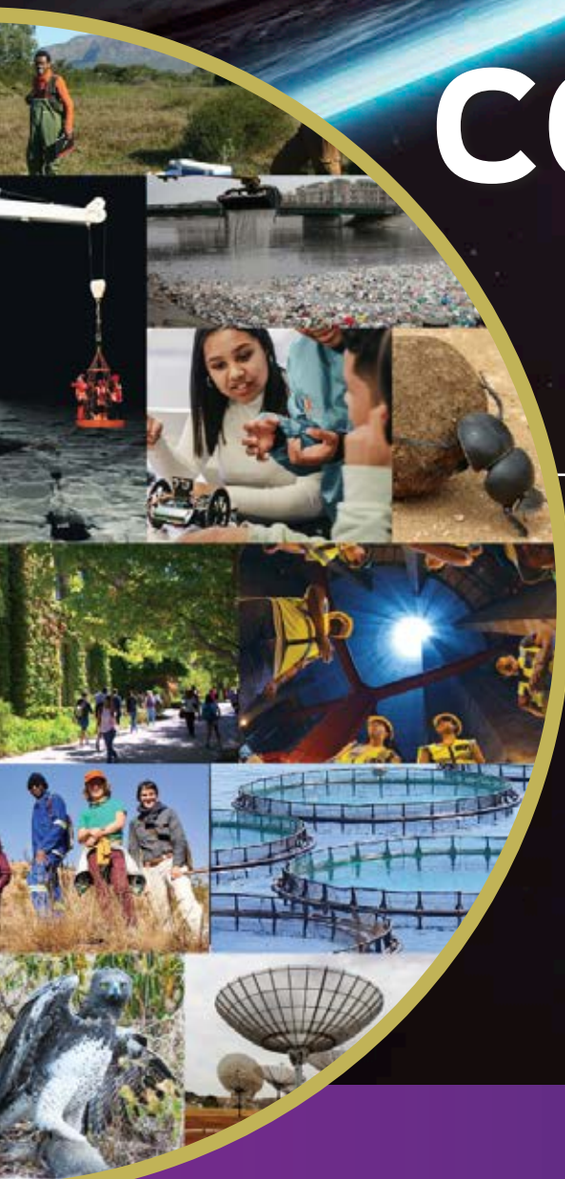
UNIVERSITY OF CAPE TOWN
IYUNIVESITHI YASEKAPA • UNIVERSITEIT VAN KAAPSTAD

DECEMBER 2021

CONTACT

NEWSLETTER FOR FACULTY OF SCIENCE



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GIVE US FEEDBACK

DISCOVER A WORLD OF OPPORTUNITIES

Message FROM THE DEAN

At the end of every year, we take stock of what we have achieved as a faculty and plan for the year ahead. As in 2020, our activities in the faculty and the university were disrupted by the coronavirus pandemic which shows no sign of ending soon. One of the main impacts of the pandemic has been on teaching and learning. In 2021 we increased the level of contact with our students from second year level to our postgraduate community and were able to conduct laboratory work and ran limited field camps while adhering to health and safety protocols. We managed to conduct in-person examinations in many of our courses and believe that the integrity of assessments is crucial for the academic integrity of our programmes and degrees. There is still a long way to go in the teaching and learning space under conditions of the pandemic, and this applies to the higher education sector in South Africa and abroad.

Our academic and PASS staff, and students rose to the challenge the pandemic imposed on us and this is evident in the achievements and creativity highlighted in this Newsletter. The 2021 Virtual Graduation Ceremony held on the 14th of December was a moment of celebration in the Science Faculty: 41 PhD students graduated in Science; Professor Nicola Illing of the Department of Molecular and Cell Biology was inducted as a Fellow of UCT; and Associate Professor Gina Ziervogel of the Department of Environmental and Geographical Science was a recipient of the UCT Social Responsiveness Award for 2020. Professors Isabelle Ansorge, Francesca Little, and Muthama Muasya delivered very stimulating inaugural lectures. We celebrate the Ad Hom promotions of 3 Professors, 7 Associate Professors, 1 Principal Research Officer, 1 Senior Research Officer, 5 Senior Lecturers, 1 Chief Scientific Officer, and 1 Principal Scientific Officer.

I hope you enjoy this 2021 edition of contact.

Happy holidays and best wishes for 2022!

Maano Ramutsindela

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Staff ACHIEVEMENTS AND AWARDS

UCT ranks among best 100 institutions globally for six subjects

The University of Cape Town (UCT) is among the best 100 institutions in the world for six subjects, according to the Quacquarelli Symonds (QS) World University Rankings by Subject 2021.

To produce its rankings, QS combines information from four sources: two global surveys of academics and employers to assess international reputation, and two indicators (research citations per paper and h-index in the relevant subject) to assess research impact. These are weighted differently depending on the discipline.

This year, QS analysed information for 1 453 institutions across 51 subjects.UCT was ranked in 36 of the 51 subjects assessed by QS. Five were placed in the 51–100 band and two were from the Science Faculty, namely Archaeology and Geography.

SHANGHAI RANKING
GLOBAL RANKING OF ACADEMIC SUBJECTS
TOP 100
2020

Science flies high in the Global Ranking of Academic Subjects

In May 2021, ShanghaiRanking placed UCT among the top 100 universities for five subject areas in its Global Ranking of Academic Subjects 2021.

UCT performed best in **Environmental Science** and Engineering, placing 23rd in the world. This significant jump up from the previous year is as a result of a prestigious award in this research field that was conferred on a retired UCT staff member, Dr Jackie King, who became the first South African woman to win the prestigious Stockholm Water Prize – regarded as the water community's equivalent of an Oscar or Nobel.

Science "Oscar" Award for Professor Sheetal Silal

In recognition of her outstanding contributions to science, engineering, technology and innovation in South Africa, the University of Cape Town's (UCT) **Professor Sheetal Silal** received the TW Kambule-NSTF Emerging Researcher award at the NSTF-South32 event. This award is in recognition of Silal's contribution through combining knowledge from biology, clinical medicine, public health and economics to develop mathematical disease models to help shape health policy and improve the health of the people.

Silal, an associate professor in the Department of Statistical Sciences at UCT and director of the Modelling and Simulation Hub, Africa (MASHA), is an expert in the development of mathematical models for predicting the dynamics of infectious diseases. Her work has become a crucial part of evaluating the potential of control programmes to reduce morbidity and mortality, as well

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as supporting policy development around public health systems. In January 2020, she was invited by the World Health Organization (WHO) to join an international taskforce of mathematical modellers to study the dynamics of a novel coronavirus outbreak in China. In March 2020, when the first COVID-19 cases were reported in South Africa, Silal was well placed to respond to the South African National Treasury's request to develop a mathematical model to investigate the dynamics of the local outbreak.

She and her team at MASHA joined other researchers to form the core modelling team of the South African COVID-19 Modelling Consortium. Responsible for projecting the spread of the virus to support the South African government's policy and planning, the consortium created a COVID-19 dashboard alerting the public to infection rates and providing analyses of the various waves at a district and provincial level. Prior to COVID-19, Silal's work largely focused on developing models to track the successes and failures of, as well as the challenges facing, the fight against malaria in Africa. Her models synthesise data to create a cohesive computer-based representation of malaria, which can then be used to test the impact of interventions such as new drugs or prevention methods in silico, at no further cost.

PROFESSOR SHEETAL SILAL

Top Science Faculty

Scholars in South Africa Honoured

Fourty-three of the country's leading scholars and scientists were inaugurated as Members of the Academy of Science of South Africa (ASSAf) at the annual Awards Ceremony in October. The Science Faculty at UCT is delighted to announce that **Professor Patrick Woudt**, from the Department of Astronomy and **Professor Shadreck Chirikure**, from the Department of Archaeology at UCT were inducted. As the official Academy of South Africa, ASSAf's core function includes honouring the country's most outstanding scholars by electing them to Membership of the Academy. Membership of the Academy is a great honour and is in recognition of scholarly achievement. Members give of their time and expertise voluntarily in the service of society.

PROFESSOR PATRICK WOUDT is Professor of Astronomy and Head of the Department of Astronomy at the University of Cape Town. He obtained his PhD in 1998 from the University of Cape Town. He is past President of the South African Institute of Physics and holds an adjunct professor position in the Department of Physics at the University of Venda. He is the co-principal investigator of the MeerLICHT telescope and the MeerKAT large survey project on astrophysical transients. He is currently vice-president of IAU Commission B4 (radio astronomy) and the co-chair of the international SKA Science Working group on radio transients.

PROFESSOR SHADRECK CHIRIKURE in the Department of Archaeology at the University of Cape Town. He obtained the degrees of MA Artefact Studies (2002) and PhD in Archaeology (2005) from the Institute of Archaeology, University College London. His doctoral thesis explored the technology and socio-cultural metaphors associated with pre-colonial iron production in southern Africa. Shadreck's Archaeological Materials Laboratory is Africa›s only facility dedicated to the study of pyrotechnology practiced by farming communities of the last 2000 years of the sub-Saharan past.

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Biological Sciences

Professor William Bond elected as

Fellow of the Royal Society

Emeritus Professor **William Bond,** from UCT's Department of Biological Sciences, has been elected as a Fellow of the Royal Society, the world's oldest scientific academy. Bond is the seventh South African to be accorded the honour and will join the ranks of other icons of science, including Charles Darwin, Isaac Newton and Stephen Hawking, when he is inducted as a Fellow later this year. Bond is recognised as a global authority on open ecosystems and his research into the forces that shape global vegetation, including wildfire, CO_2 levels and herbivores, is credited with transforming our understanding of how these systems emerged.

In 2013 he was admitted as a foreign associate of the United States' National Academy of Sciences and in 2020 was once again included in the Highly Cited Researcher list, which recognises the contribution of scientists who demonstrate significant and broad influence through the publication of multiple papers frequently cited by their peers over the course of a decade.

The first time Bond travelled to give a speech at the Royal Society he was in awe of the beautiful building and august history of the society, including the book which holds the signatures of all Fellows, including the likes of Isaac Newton and Charles Darwin. "Charles Darwin has always been a hero of mine because he is such a wonderful guide to travelling the world as a biologist and such an astute observer of human society," Bond says.

Bond says at this moment in time when misinformation is a real danger and the biomes that he have spent his career studying are under serious threat, it is a great honour to be recognised by an institution such as the Royal Society which promotes the role of science. "Science has given us a way to test new human ideas and that is something to be treasured. Reason has been such a powerful tool for us humans, but logic alone is not the answer. In fact, science requires the imagination to make connections that lead to new discoveries and this creativity comes from all sorts of sources, including art, music, myth and poetry. I think that's where South Africa and Africa has much to offer: our perspective is unique and valuable; it leads to new ways of seeing," Bond says.

Speaking at the announcement of the 2021 cohort of 52 fellows chosen from over 700 applicants, Sir Adrian Smith, President of the Royal Society, says the global COVID-19 pandemic has demonstrated the importance of scientific thinking and collaboration across borders. "Each Fellow and Foreign Member brings their area of scientific expertise to the Royal Society and when combined, this expertise supports the use of science for the benefit of humanity."

UCT College of Fellows and Royal Society of South Africa

induction for Prof Nicci Illing

Professor Nicci Illing from the Department of Molecular and Cell Biology was recently elected a Fellow both of UCT, and of the Royal Society of South Africa, on the basis of her research. Induction to the College of Fellows at UCT is one of the highest recognitions an academic staff member can receive for their work. It signals original, distinguished academic work that merits special acknowledgement.

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Climate change

expert bags Social Responsiveness Award

Associate Professor Gina Ziervogel has has received UCT's prestigious Social Responsiveness Award in recognition of her work on urban water resilience and social justice and her ongoing efforts towards achieving social justice in her discipline.

Who can forget Cape Town's record-breaking, once-in-a-century drought? Dam levels were at an all-time low, and that ominous phrase "Day Zero" dominated the news agenda both locally and abroad. Associate Professor Gina Ziervogel, UCT geographer and climate change adaption expert, was part of a multi-disciplinary team who raced to find solutions for the region's water crisis.

Based in the Department of Environmental and Geographical Science in the Faculty of Science, Associate Professor Ziervogel was appointed to the City of Cape Town's Water Resilience Advisory Committee in 2017 to provide expert input on the City's drought plans. Since then, she has not looked back. Her work on urban water resilience and social justice sheds much-needed light on the manner in which the City handled the region's drought, and how a metropole should better engage with residents around water issues. "This award is very special to me. I have sometimes wondered about my place in academia. But over the past few years I feel I have really been valued as an academic [who] engages in socially responsive work."

Winning the Social Responsiveness Award is a "wonderful and moving" recognition of her work in this field. And to further support and enforce social responsiveness in academia, Ziervogel also created a competition aimed at UCT students. Part of the requirement criteria was that they submit their ideas on how they'd use their winnings to make their research accessible to those outside academia. The competition necessitated that the students' research topics be related to the environment and social justice. Ziervogel donated her award winnings as the prize.

Climate Change resesarcher selected for global STEMM leadership initiative

Associate Professor Gina Ziervogel, a geographer and climate change adaptation expert based in the Department of Environmental & Geographical Science at UCT, has been selected to join Homeward Bound, an international leadership programme that encourages women working in STEMM (science, technology, engineering, mathematics and medicine) to take up leadership positions. According to the World Economic Forum, only 30% of global researchers in STEMM are women. Overall, women also still hold far fewer leadership positions, both in science and technology, than their male counterparts. In the United States women currently make up 48% of the workforce but hold less than 18% of leadership roles at top tech companies. In South Africa, according to Stats SA, women make up 23% of the STEM workforce. Homeward Bound, an international initiative started in 2016 by Australian entrepreneur, Fabian Dattner, aims to change that. Each year 100 women from all over the world are selected to join the 12-month leadership programme, culminating in a voyage to Antarctica.

Ziervogel, who will be one of 25 nationalities joining this year's programme, has a particular interest in water and governance. During Cape Town's recent drought she was appointed to a water advisory committee for the municipality governing the city. "During Cape Town's recent drought I was excited to bring my years of experience in climate adaptation research to bear in my own city, contributing to looking at what actions we can take to reduce vulnerability to climate change," she says. "Now I am looking forward to joining a programme which is centred around both personal development - encouraging women in STEMM to seek leadership positions - as well as a core understanding of the pressing need for scientists to collaborate to create a more resilient future in the face of climate change."

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Assoc Prof Moodley to join

ICA #4 on Intelligence and Artificial Intelligence

The Intercontinental Academia (ICA) has chosen **Associate Professor Deshen Moodley** from the Department of Computer Science at UCT, (pictured right) as a fellow for the 4th edition of ICA. The ICA creates a global network of future research leaders in which some of the very best young academics work together on paradigm-shifting, cross-disciplinary research, mentored by eminent researchers from across the globe, including Nobel prize winners Robert Aumann and Ada Yonath. Moodley, a member of the recently established AI Research Unit, an accredited research unit in the Department of Computer Science in the Faculty of Science, is one of just nineteen fellows selected globally to participate in the 4th ICA on Intelligence and Artificial Intelligence. The 4th ICA will start with a virtual opening meeting in June 2021, followed by two main sessions in Paris, France in October 2021, and in Belo Horizonte, Brazil in June 2022.

Moodley's research focuses on the development of Adaptive and Cognitive Systems. His current interest is on general mechanisms for model learning, model update, knowledge discovery and belief revision. His research has a strong applied focus, and he is investigating novel ways to engineer adaptive "thinking" systems for data fusion, situation analysis and prediction and knowledge discovery in diverse application domains, including health, biodiversity, finance, and earth observation. The AI Research Unit (AIRU) hosts two research groups and the Directorate of South Africa's national Centre for AI research (CAIR). CAIR is a distributed South African research network with nine established and two emerging research groups across eight universities funded primarily by the Department of Science and Innovation (DSI).

Forbes Africa The List: Women in Science

Associate Professor Sheetal Silal from the Department of Statistical Sciences, UCT; and Director of the Modelling and Simulation Hub, Africa, who is also an Honorary Visiting Research Fellow at Oxford University in the United Kingdom, was recently named as one of Forbes Africa's notable Women in Science, in recognition for her work as part of the South African Covid-19 modeling consortium and of the team that has created a dashboard to map the underlying risks associated with the pandemic. This allows for alerting the public of infection levels and provides an analysis of second waves at a district and provincial level.

Mathematicians and data scientists have been at the heart of the response to the Covid-19 pandemic as they have assisted with understanding underlying trends, mapping possible risk factors, and determining the possible rate of virus spread. "I have always had a passion for helping people and the African continent has always been plagued by endemic, highly contagious diseases; being in the field that I am has allowed me to study this closely and contribute [in whatever way] I can to combat these diseases," she says. She believes that to attract more women to the sciences, they need to be encouraged to explore it at a primary level and programs need to be created for more awareness on the options available to them. The motto that she swears by? "It's impossible until it's done!"

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Prestigious award proves UCT's
Rosalie Tostevin rocks

Dr Rosalie Tostevin has been recognised by international peer reviewers for her potential as a leader in her field. Dr Tostevin, who heads up the Ancient Life and Environments (ALE) Lab in the Department of Geological Sciences, is the latest UCT researcher to be awarded a prestigious P-rating from the National Research Foundation (NRF), proving that this geologist does indeed rock!

The geology lecturer described her research as the study of interactions between life and the environment in "deep time", meaning millions to billions of years ago. Because the earth was so different then, Tostevin likened it to "studying an alien planet". Her research entails reconstructing conditions from the physical and chemical traces left behind in the rocks and involves "careful detective work". Understanding even the basic aspects of the environment, such as temperature or oxygen levels, can be a challenge.

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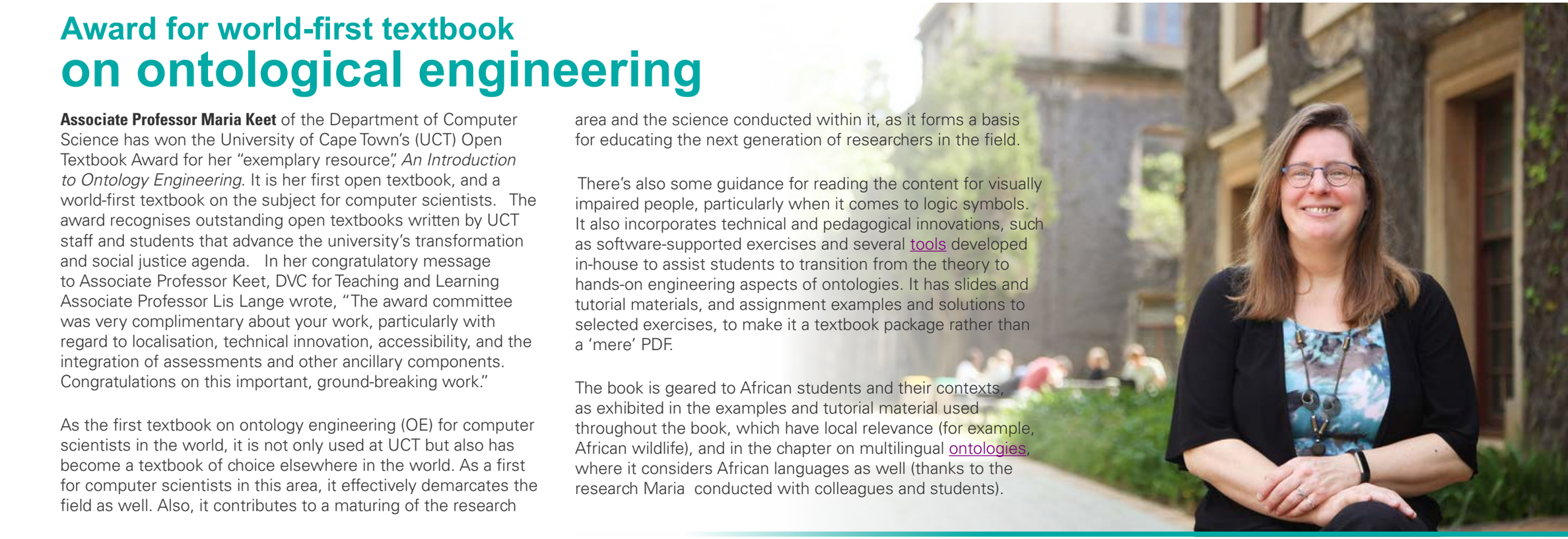
UCT drug discovery trailblazer among
Juneteenth biotech leaders

Professor Kelly Chibale, the founder and director of the University of Cape Town's (UCT) Drug Discovery and Development Centre (H3D), has been named among 22 rising black biotech leaders in the Timmerman Report, published in the United States (US). Professor Chibale is the only Africabased scientist included in the group. The list was published to honour innovative black biotech leaders who are changemakers in their fields. Its publication marked Juneteenth (sometimes called Black Independence Day) on 19 June, a US federal holiday commemorating the emancipation of African-American slaves in 1863.

Chibale, said he was honoured by the latest acknowledgement. "As a hardcore natural scientist and entrepreneur, I believe in the power of science to transform lives and create jobs," he said. "Encouraging, supporting and incentivising scientific entrepreneurship will help move the continent of Africa forward." "I believe in the power of science to transform lives and create jobs." The listing also affirms Chibale's vision to seed an innovative pharmaceutical research and development (R&D) industry in Africa. "I am relentless when it comes to pursuing this vision. For our work and lab, it shows [that] what we do collectively is world-class." Chibale said he hopes it will inspire and encourage other black researchers to use the disadvantage they feel and/or experience on the basis of their race as an advantage. Despite the "real boundaries" to black scientists, one has to make a personal choice, he said.

Award for world-first textbook
on ontological engineering



Associate Professor Maria Keet of the Department of Computer Science has won the University of Cape Town's (UCT) Open Textbook Award for her "exemplary resource", *An Introduction to Ontology Engineering*. It is her first open textbook, and a world-first textbook on the subject for computer scientists. The award recognises outstanding open textbooks written by UCT staff and students that advance the university's transformation and social justice agenda. In her congratulatory message to Associate Professor Keet, DVC for Teaching and Learning Associate Professor Lis Lange wrote, "The award committee was very complimentary about your work, particularly with regard to localisation, technical innovation, accessibility, and the integration of assessments and other ancillary components. Congratulations on this important, ground-breaking work."

As the first textbook on ontology engineering (OE) for computer scientists in the world, it is not only used at UCT but also has become a textbook of choice elsewhere in the world. As a first for computer scientists in this area, it effectively demarcates the field as well. Also, it contributes to a maturing of the research area and the science conducted within it, as it forms a basis for educating the next generation of researchers in the field.

There's also some guidance for reading the content for visually impaired people, particularly when it comes to logic symbols. It also incorporates technical and pedagogical innovations, such as software-supported exercises and several tools developed in-house to assist students to transition from the theory to hands-on engineering aspects of ontologies. It has slides and tutorial materials, and assignment examples and solutions to selected exercises, to make it a textbook package rather than a 'mere' PDF.

The book is geared to African students and their contexts, as exhibited in the examples and tutorial material used throughout the book, which have local relevance (for example, African wildlife), and in the chapter on multilingual ontologies, where it considers African languages as well (thanks to the research Maria conducted with colleagues and students).

Computer Science project wins first prize in global
Connecting the Unconnected challenge

The iNethi project, which is led by **Associate Professor Melissa Densmore**, **Dr David Johnson** and **Dr Josiah Chavula** from the Department of Computer Sciencer at UCT have just been announced as first prize winner of the annual IEEE CTU Connecting the Unconnected Challenge. They won the Community Enablement Proof of Concept 1st Place Award, winning an amount of $7,000.

iNethi seeks to work with communities to co-design a content sharing and services platform for community wireless networks. Their goal is to build more resilient communities by using information technologies to help them tap into local creativity, innovation, and other resources, with an eye towards improvement of socio-economic status.

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NSTF Public Engagement with Research Award

to Professor Rachel Wynberg

Professor Rachel Wynberg from the Department of Environmental & Geographical Science at UCT, was awarded the NRF Public Engagement with Research Award at the NRF Awards.

Professor Wynberg holds the DSI-NRF Research Chair in Environmental and Social Dimensions of the Bio-economy. The bio-economy covers a broad range of areas from healthcare and food security to poverty reduction and environmental remediation. It includes, among other things, the commercial use of biodiversity and traditional knowledge, genetic engineering, the processing of biological raw materials, biofuels and waste management.

Located at the interface of fast-changing genetic and information technologies, and the juncture of a wide range of social, environmental, political and ethical concerns, Prof Wynberg's Research Chair asks critical questions about the governance of the bio-economy and who stands to benefit; the involvement of local and Indigenous communities; sustainable agricultural futures; and the environmental and societal implications of biotechnology. Prof Wynberg consciously seeks to engage society with her research, tailoring her message to different audiences, including policy– and decision-makers, civil society organisations, local communities and Indigenous groups. She does this by utilising a range of communication approaches such as policy briefs, pamphlets, posters, zines and blogs, innovative videos, podcasts and use of the creative arts; community capacity-building and research feedback workshops; and multi-actor seminars, conferences and webinars. This has enabled her to reach a wide audience while remaining mindful of the architectures of different knowledge systems and multiple ways of knowing.

Prof Wynberg's work has narrowed the knowledge gap between science and society and has helped to foster critical thinking of the environmental, social and political dynamics of the bio-economy among community members, and how these affect society.

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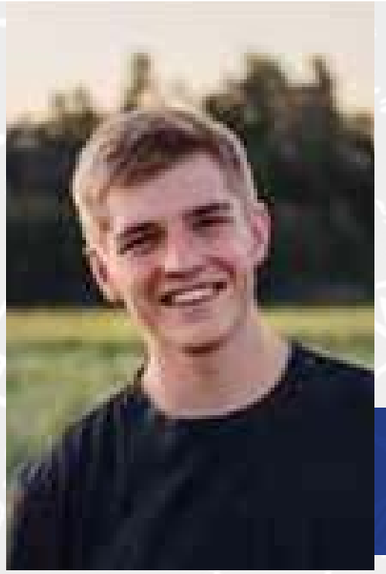
Students ACHIEVEMENTS AND AWARDS

Oceanographer wins best presentation award at International Conference

Congratulations go to **Sive Xokashe**, an MSc student in the Department of Oceanography won the best presentation award at the International Global Atmospheric Chemistry conference. His prize includes registration and travel to the 2022 IGAC conference which is being held in Manchester, UK. "He was one of only a few MSc students, so it is quite an honour for him to win this prize" said his supervisor **Dr Katye Altieri**.

"I like the research that I am doing because it exposes me to adventures and takes me to places that are beyond my wildest dreams" says Sive. "It took me to Antarctica (2019) but more importantly, it immerses me into a field of science where I get to tackle portions of big questions related to issues ranging from human health, climate change, and ecosystems productivity. These questions were basically the broader scope of the poster I presented at IGAC. In the research that we are doing in the Southern Ocean, we are interested in the particles that are largely released from the ocean into the atmosphere (we call them aerosols) but in particular, the acidity of these particles, in order to improve our understanding of their impacts on climate change (they largely scatter radiation, thus helps in cooling the planet), human health (acidic particles are associated with adverse health effects) and ecosystem productivity (the particles acts as one of the sources of nutrients for food productivity in various ecosystems).



UCT student ties for first in SA Tertiary Mathematics Olympiad

Tim Schlesinger's win marks the ninth time a UCT student has claimed the top spot at the South African Tertiary Mathematics Olympiad since 2012.

UCT third-year BSc student **Tim Schlesinger** tied first with two other students at the South African Tertiary Mathematics Olympiad. Two university students from the Western Cape have come up tops in the South African Tertiary Mathematics Olympiad.

The Olympiads aims to include a culture of mathematics, to appreciate and acknowledge the critical role of mathematics in the technological environment. To develop programmes that will contribute to the mathematical development of South Africans, to impact positively on the standard of mathematics teaching and learning and to promote research in mathematics and mathematics education.

Tim said mathematics had been a passion and gift of his since his mother nurtured it in him from an early age. "I think God gave me a natural gift for numbers, and doing mathematics is a way for me to glorify him," he said. He said he had done the Olympiads throughout high school and university, and the latest was just another one among the many, and he first competed after being picked up by the South African Mathematics Foundation coach from the later rounds of the UCT maths competition. "This Olympiad went particularly well. I felt good about it on the day, and it ended up showing in the result. I was tied first with two other learners, with 18/20," he said.

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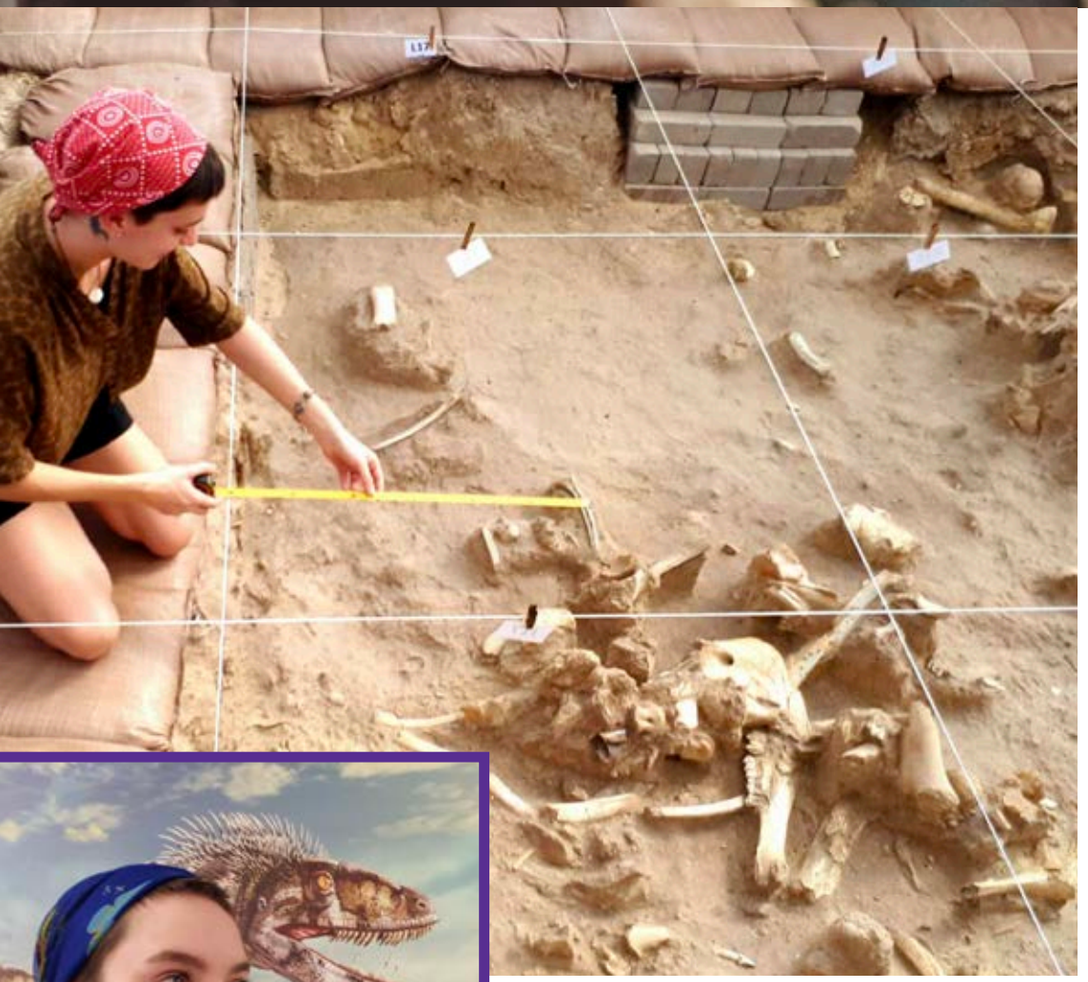

Palaeobiologist
shines in FameLab competition

Caitlin Rabe a Masters student in the Palaeobiology lab in the Department of Biological Sciences took part in the FameLab SA 2021 competition where she talked about her passion for palaeosciences.

As an avid public speaker, encouraged by both of her parents whose combined experience in the entertainment industry offered her a glimpse into the power of good communication, Caitlin entered FameLab with the hope of learning the nuances of science communication and preparing for a future in education and science advocacy. Congratulations to Caitlin who was declared the runner-up.

In her own worlds, Caitlin explains: "For my FameLab Semi-final entry I really wanted to convey my passion for palaeoscience, and explain the relevance of the work we do. To do this, I used examples from my own research to illustrate how palaeoscientific methods can reveal amazing clues about our past and help to create a window through which we can look at prehistoric life with awe and curiosity. I started, as every good story should, in the beginning - not the beginning of the Earth, mind you, but rather my beginning as a scientist - where I fell hopelessly in love with Spielberg's cinematic masterpiece 'Jurassic Park'. Once I had seen the wonder of those charismatic creatures, the gentle giants and ferocious beasts, I was hooked. I go on to explain that palaeoscience may seem like an odd choice of career, in the face of global change, economic uncertainty and social unrest, and I offer an explanation for my choice of my vocation. A fossil, while superficially inanimate and rock-like, transforms into a prehistoric portal in the hands of a palaeoscientist. I describe a journey through time to the Permian period (approx. 250 MYA) where, through the careful examination of fossils, sediment cores, isotopic analysis and more, we can see the story of a little Dicynodont family unfold. The adults greet the day, stepping out onto the same sand where people now walk, while their young lie sleeping in a subterranean spiral burrow. Concluding my story, I mention that although the dicynodonts eventually became extinct, their pioneering cousins forged ahead to give rise to the same branching lineage that we are a part of. Palaeohistory is our history, and it is humbling to remember that we have shared this planet with so many unique and wonderful living beings. Ending with an iconic Jurassic Park quote, "Life finds a way..." I conclude that when faced with such uncertainty around our future, one need only look to the past to be reminded of the power and resilience of life on Earth. "

Caitlin's MSc research focuses on a small species of dicynodont called Diictodon feliceps. These little burrowing animals from the Karoo Basin of South Africa are an interesting mix of reptilian morphology and mammal-like characteristics, and their remains are uniquely abundant in the South African fossil record.

Inaugural LECTURES IN FACULTY

Professor Isabelle Ansorge: Teaching the many (50) shades of blue – while the world is changing its shade"

Oceanography's first woman head of department **Professor Isabelle Ansorge** delivered her inaugural lecture on 14 April. In 1983 Professor Isabelle Ansorge's father took the 14-year-old out of school for six months to join him aboard a Polish barquentine and "class afloat", the RV Pogoria, on its voyage around Africa. Amid billowing sails and spume, she tackled maritime chores, cleaning and painting. So began a love song to the sea. "That changed my life, and I sit where I am because of that one experience," Professor Ansorge said in her inaugural lecture.

Ansorge's oceanographic research had become "the focus of a remarkable academic career", Vice-Chancellor Professor Mamokgethi Phakeng said in her welcome. Ansorge was the first woman at UCT to obtain a PhD in oceanography and the first to head the department in this male-dominated field, Dean of Science Professor Maano Ramutsindela added in his introduction. "Isabelle has a long association with UCT, since 1993—in those formative years of our democracy, Isabelle was busy creating a niche in oceanography" he said. Through a career in observational oceanography, that niche in research is creating a greater awareness of the ocean's physical, biogeochemical and ecological response to climate change; the first part of her lecture.

The second part introduced the audience to the SEAmester programme aboard the ice-breaker and research vessel the SA Agulhas II, South Africa's flagship marine and polar research vessel. SEAmester's floating university offers all earth system postgraduates across South Africa a free and fair opportunity to gain access to this research platform. It's an unforgettable experience, said Ansorge, with a nod to some formidable storms they've braved in the past when the ship's 12-metre-high bow has disappeared under rolling breakers

Prof Ansorge highlighted how a knock-on effect of climate change is going to be a gradual cooling in the Northern Hemisphere around Europe and North America, because of the Greenland melt. She said that this situation highlights the importance of monitoring oceans and explained that as an oceanographer you need to get instruments into the ocean to measure the physical and chemical changes. In 2013 South Africa deployed a long-term monitoring array: an observation network of instruments that form the South Atlantic Meridional Ocean Circulation (SAMOC-SA) system. The initiative is led by Ansorge, Marcel van den Berg and UCT honorary research associate Dr Tarron Lamont, both of the Department of Environmental Affairs' Oceans and Coasts division in Cape Town.

Thanks to the *SA Agulhas II,* an array of eight Current Pressure Inverted Echo-Sounder (CPIES) moored instruments were deployed into the South Atlantic as part of the SAMOC-SA system. This completes a network of eight bottom-moored CPIES and four deep-ocean moorings that record vertical acoustic travel time and near-bottom pressure and velocity. From these, measurements such as temperature, salinity and north–south velocity throughout the water column can be inferred. "It's a huge international programme aimed at measuring the volume and rate of flow of water moving northwards," said Ansorge. "While the dataset is relatively young (since only 2013), we need to get started with these measurements to understand better how this flow is changing over years and eventually decades. Of interest is to quantify the salt leakage coming from the Indian into the Atlantic and try to understand whether that is changing, and what the variability scale is: Are we looking at a timeframe of one year, 10 years, or more than two, three decades?" Because of the long-term nature of this project, universities like UCT need to train new generations of postgraduates to continue this work; people who have the same passion for the ocean that ignited Ansorge years ago. This is SEAmester's role.

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Professor Muthama Muasya:

A safari across the African savannah and into the Cape

Prof Muthama Muasya took to the virtual stage to present an inaugural lecture fitting for the time and suited to the continent. His research focuses on the taxonomy and evolution of plants with a special emphasis on Africa and the Cape region. The lecture, titled "Biodiversity studies in the Anthropocene: from species discovery in fragmented landscapes to unravelling the origin of iconic African flora" was hosted by Vice-Chancellor Professor Mamokgethi Phakeng on Wednesday, 26 May.

"It's humbling to have been invited to talk to you this evening. I find it a good coincidence that I am speaking about biodiversity and African heritage in the week and month that we are celebrating Africa, and where the theme for this year is 'Africa's arts, culture and heritage'," said Professor Muasya, referring to the African Union's 2021 Africa Day theme. A recurring theme in his research relates to documenting the region's diversity and seeking explanations to what underpins the evolution of plants over space and time. During his lecture, he discussed species discovery in the Cape flora, and presented several highlights on the evolution of the African savannah known as the Cradle of Humankind.

"Africa has a rich biodiversity, whether it's ecosystems, species kinds or species variations. Five major biomes occur [and] the vegetation is determined by rainfall, temperatures, seasonality, elevation and soils," he said. The African Savannah ecosystem is a tropical grassland with year-round warm temperatures, and distinct wet and dry periods. The savannah is characterised by grass and small or dispersed trees that do not form a closed canopy and allows sunlight to reach the ground.

The process to identify and document the world's biodiversity has progressed over the past 300 years and herbarium (: the process of preserving pressed plant species with accompanying field data) plays an essential part in this process. "The collection of herbarium specimens in the Cape began in the 1600s," said Muasya.

He further explained that UCT's Bolus Herbarium, which includes the Bolus Herbarium Library, was bequeathed to the university 150 years ago and is the oldest functioning herbarium in South Africa. With close to 500 000 specimens, the herbarium boasts one of the largest university collections in the world. In the past decade alone, it has played a significant role in helping scientists understand the Cape flora.

Muasya pointed out that flora found in southern Africa has a complex biogeography, built in response to a range of drivers. He focused part of his lecture on the Eastern Overberg Renosterveld – one of the most unique vegetation types in the Cape Floral Region. He said that this vegetation is "highly fragmented" by agriculture and has produced a number "novelties" recently. The quartz habitats in the region host more than 25 narrow-ranged species among 70 red-listed species. Furthermore, the Cape fynbos also contributed to and received taxonomy from other biomes and received long-distance dispersal all the way to Australia. Muasya said he remains humbled and privileged to serve diverse communities of practice and to contribute to taxonomic plant science expertise in Africa. "In my journey I have [received] knowledge and goodwill from others and I enthusiastically share it. In the words of the African theologian and philosopher Professor John Mbiti, 'I am because we are and, since we are, therefore I am'," he said.

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Professor Francesca Little from the Department of Statistical Sciences delivered her inaugural lecture entitled, "Longitudinal Analysis of Multivariate Responses", on Monday 25th October 2021.

Professor Francesca Little:
Longitudinal Analysis of Multivariate Responses

Prof Little commented, "There is much awareness these days about the availability of lots of data and methods for dealing with that. In the medical sciences, one of the ways in which lots of data are generated is through the repeated measurement of outcomes of interest at multiple successive timepoints. Another is the measurement of many different but related outcomes for the same subjects." The presentation focused on the statistical modelling of such complex data from the medical sciences.

Longitudinal Data Analysis refers to the modelling of repeated measures of the same response for subjects over time. There are various approaches to model these data that take into account the within-subject correlation, the most popular being the use of mixed effect models. Increasingly, research studies do not focus on just one longitudinal response over time, but multiple such responses.

For example:

1. **Different cytokine measurements as possible immune markers for TB.**
2. **Different brain metabolite measurements in young children.**

Prof Little's research activities originate from her collaboration with the Health Sciences, predominantly in the areas of Malaria, TB and HIV research and the analysis of data from longitudinal birth cohorts, leading to an interest in statistical methodological topics of nonlinear mixed effect modelling, zero-inflated mixture distributions for discrete data, analysis of time to event outcomes, casual modelling in observational studies, longitudinal studies with missing data, growth curve modelling, simulation models for infectious diseases, latent variable modelling and multivariate analysis.

Her main contribution to these research collaborations is the use of state-of-the-art statistical modelling to enhance the quality of the medical research, in order to make a difference to the quality of life of vulnerable populations in Southern Africa.

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Impact OF FIRE ON FACULTY

Fire Damage to the Science Faculty Buildings

On Sunday 18th April the fire that started on the mountain above Philip Kgosana Drive soon blazed out of control and, driven by strong winds, reached UCTs campus, damaging the Jagger Reading Room (previously the JW Jagger Library), the HW Pearson Building, and the Fuller Hall and Smuts Hall student residences. The raging fire which destroyed so much of value on UCT property and the surrounding areas impacted the Science Faculty hugely.

The **HW Pearson Building** sustained considerable damage and impacted staff and students whose work and research . Two units in **particular sustained near total losses – the** Plant Conservation Unit (PCU) and the **Institute for Communities and Wildlife in Africa (iCWild)**. Although the rest of the building did not burn, there was extensive fire-related and especially water damage across multiple floors, and it is likely that the building will not return to full capacity until the end of the year. Both greenhouses also sustained some damage.

Professor Maano Ramutsindela said, "We also wish to acknowledge that the loss of the Jagger Reading Room, and the loss and relocation of many of its collections, also has a substantial effect on our faculty. Many of our colleagues depend on those resources, particularly those in disciplines that research the recent and deeper human past in Africa. But all was not lost in the fire, and indeed there were many incredibly brave acts that kept it from being worse than it might have been. We thank those colleagues who played a role in keeping UCT buildings safe. We also wish to thank members of our faculty who have helped to recover materials from Jagger Library following the fire. It has been a difficult time, and your acts are deeply appreciated".

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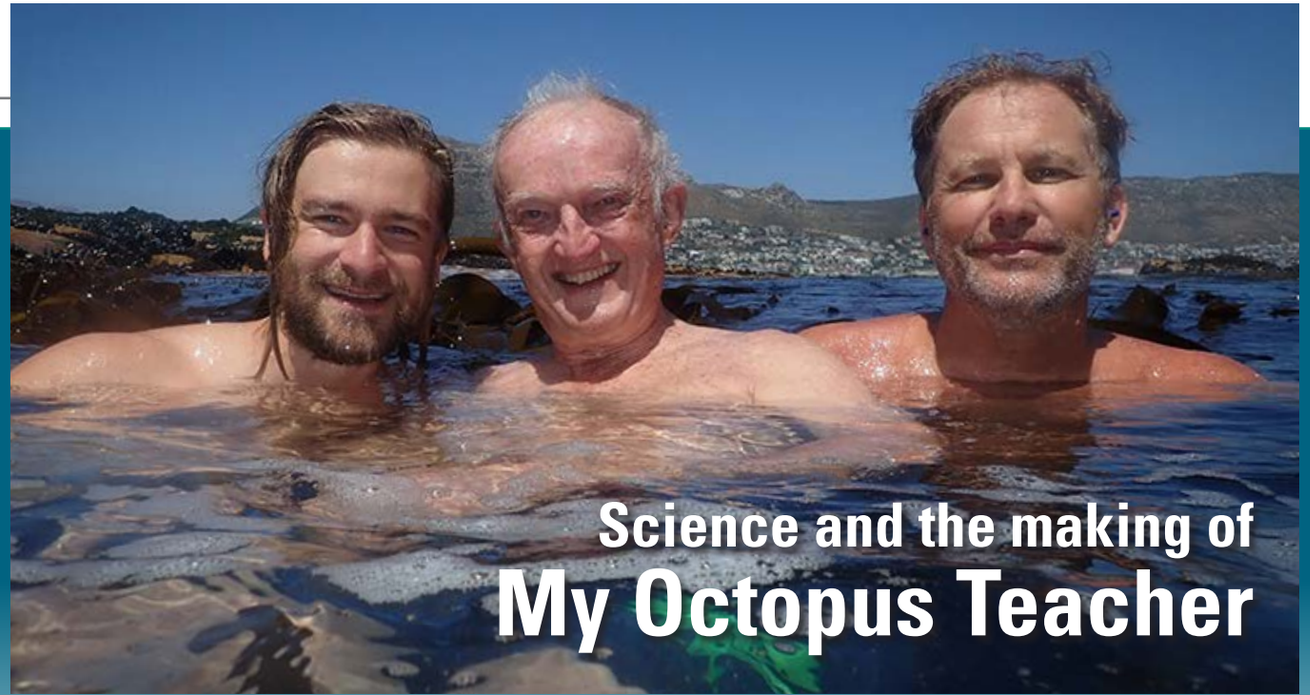
Alumni IN THE NEWS



Science and the making of My Octopus Teacher

The star of the Oscar-award winning Best Documentary "My Octopus Teacher", in her False Bay lair. Photo Craig Foster.

The news that My Octopus Teacher had won an Oscar for the Best Documentary at the 93rd Academy Awards was met with elation in the Cape Peninsula's Deep South where naturalist, film-maker and co-star Craig Foster lives and freedives. But underpinning the film was his relationship with two University of Cape Town (UCT) marine biologists, Foster's science and marine tracking mentors. They are friend and fellow seashore explorer **Charles Griffiths**, now an emeritus professor in the Department of Biological Sciences, and UCT alumnus **Dr Jannes Landschoff**, who is listed as scientific advisor on My Octopus Teacher. Some years before Foster encountered his octopus co-star, he'd learned how to track and understand marine life in False Bay's rich intertidal region in the company of the scientists.

Foster is involved in the Sea Change Project, a not-for-profit organisation with a mandate to conserve the oceans and human origin heritage. In an interview with UCT News in 2017, Foster recounted how his job as a wildlife film-maker and advocate for the oceans came from his ability to communicate science in 'pictures and stories'. "But I wasn't able to speak that science language very well and Charles kindly offered to let me join him and Jannes," he said.

Foster had turned to the sea after suffering a burnout. He learned to freedive; to connect with something greater than himself: the underwater world. By 2017 when he spoke with UCT News, he had been freediving in the sea below his home for six years. It took three years to develop his underwater tracking skills and system, with the help of Griffiths and Landschoff. "In the first two years I found almost nothing," Foster said. "And then I started noticing little signs and little tracks. Sometimes you watch incredible behaviour, but you don't know it's amazing because you don't know what it is! And then the different things start to speak to you." That happened with the octopus.

It took six months for the female cephalopod to trust him in her predator-dense environment. Eventually she took him on hunting expeditions. From her, Foster learned how to move so that he did not give off pressure waves. Eventually, she allowed him into the front part of her den where he placed a camera. Footage showed her as a rigorous housekeeper, using her siphon to jettison sand and debris that the tide had

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Continued.. **Science and the making of My Octopus Teacher**

washed in. Surprisingly, she didn't eject the camera that she allowed Foster to place in her den.

What My Octopus Teacher could not include were other scientific discoveries. Griffiths noted that although it was not the film's focus, the trio discovered "at least half a dozen" species new to science during filming. One of these was a species of shrimp that Foster noticed was cohabiting with the octopus in her lair. Foster filmed the shrimps, unaware of the scientific implications. After Griffiths asked him to collect a sample from the den, it was confirmed that the shrimps were new to marine science and the species was subsequently named Heteromysis octopodis. However, Foster found another shrimp in False Bay, also new to science, which was named after him: Heteromysis fosteri.

Griffiths is suitably chuffed with the film's award, for what had at first appeared to be "a delightful but fairly niche natural history production about the unusual relationship".

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UCT alum wins The Earthshot Prize for restoring coral reefs

UCT alum Gator Halpern (right) won the Earthshot prize for restoring coral reefs.

Trailblazing entrepreneur Gator Halpern, who recently scooped one of the most prestigious environmental awards in history, has credited the University of Cape Town (UCT) for helping to shape his mission to restore dying coral reefs. Halpern, who won the Earthshot Revive our Oceans award with his Coral Vita business partner, Sam Teicher, spent a pivotal six months on a Semester Study Abroad programme at UCT in 2010.

The Earthshot awards were launched two years ago by Prince William and Sir David Attenborough, to generate a global movement to repair the planet. The inaugural winners were announced at a glittering awards ceremony at London's Alexandra Palace in October.

Galpern and Teicher founded Coral Vita to solve one of the planet's greatest environmental challenges – preserving coral reefs. Coral Vita creates high-tech coral farms. The coral is grown in tanks at a rate 50 times faster it grows in nature, and then outplanted into degraded reefs. "Coral reefs are the first major ecosystem around the world where we're seeing collapse due to climate change. We've already lost half of the world's coral reefs. The latest scientific projections predict that over 95% of the reefs on earth will be dead by 2050," said Halpern.

Coral Vita is pushing against the tide to change the situation.

"Despite only covering less than a percent of the ocean floor, coral reefs support over a quarter of all known marine species. They're the most biodiverse habitat on Earth. It's a serious socio-economic issue too, because reefs provide enormous benefits to communities around the world and support the livelihoods of up to a billion people."

Supplying the world

They aim to revive life in the ocean through their high-tech coral farm in Grand Bahama. Using Coral Vita's methods, a single farm could potentially supply coral for an entire nation. Halpern and Teicher envisage a network of farms in all countries with coral reefs, with the ultimate goal of protecting reefs and boosting their resilience against warming oceans that threaten their survival.

Coral Vita was one of five winners in five categories chosen

from 750 applications, include cutting-edge technologists, innovators, the country of Costa Rica for protecting and restoring nature, and the city of Milan for its work in pioneering food-waste hubs. The five category winners were selected by The Earthshot Prize Council, and were chosen for their groundbreaking solutions to the greatest environmental challenges facing our planet and their ability to scale their impact globally in response to the urgent challenges we face.

Winners receive £1 million in prize money and are given tailored support and opportunities to help scale their work.

For Halpern, the journey to the coveted award started when he was a child. Growing up in San Diego in California, the ocean always had a pull. "I spent as much time as I could on the beach and in the waves. I have a deep passion and love for the ocean, and for the natural environment in general. South Africa opened my eyes to the kind of issues that societies face around the world, and UCT played a key role in kick-starting my academic career. The programme was great in fostering a global vision and discussing challenges," he said. "It led me into doing more research in environmental science, and eventually going to grad school at Yale, where we ended up founding Coral Vita. If I hadn't had those experiences at UCT, I may never have ended up starting this company and pursuing the career path I'm on."

As an undergraduate, Halpern spent the first semester of 2010 in UCT's Department of Environmental and Geographical Science, as part of UCT's Globalisation, Environment & Society Semester Study Abroad programme that the department runs each year for up to 12 students from one of three US liberal arts colleges. Halpern describes UCT Professor Michael Meadows as a "mentor and key influence" on his life during his student years. He supervised Halpern's research project.

Based on historical aerial photography, the research used geographical information systems (GIS) to map changing land use over the last 70 years in the Swartland region north of Cape Town. It showed how, in the last two decades, wheat farming has been giving way to vineyards and urbanisation in response to economic and demographic change in the region. The paper was published in *The South African Geographical Journal*.

Professor Meadows described the award as "an extraordinary achievement by a young man who has had the vision, the determination and the talent to do something tangible about a really serious environmental issue". "Gator and his partner are indeed blazing a trail in the quest for a sustainable future for the world's coral reefs, at a time when these important systems are facing increasing pressure. When Gator was at UCT, he stood out among his peers – not only for his considerable academic ability and passion for what he believed in, but also for his bright and engaging personality," said Professor Meadows.

help us to jumpstart our development of other farms around the world." Halpern said the surrounding fishing villages were also devastated, so their first priority was to help people who had lost their homes. "There was nothing to stop the waves and storm surge from wiping the houses away. Finally, after a couple of months of relief work, we transitioned back to Coral Vita and started to rebuild the farm." As it turned out, they were able to expand the facility and make it stronger and better than it had been before the hurricane.

Halpern said the award is incredible recognition for the team, and for the community in the Bahamas who had been so welcoming and embracing of the project. "Winning the award will allow us to do a few really important things.

A magical time

Halpern also played first-team football for UCT, and spent time travelling to the Kalahari desert and along the Garden Route. "It was a magical time of my life, in which I made lifelong friendships."

But despite Halpern's clear career path in the environmental space, there have been swirling currents along the way. Two years ago, he felt the effects of climate change in an intensely real way, when the most powerful hurricane ever recorded in the Caribbean, Hurricane Dorian, tore into the Caribbean coast – and Grand Bahama, where Coral Vita's farm is based.

"A slow-moving tidal wave crossed over our island. The building was completely under water, all our tanks were washed out to sea, and the coral farm was destroyed. The award will ... help us to jumpstart our development of other farms around the world."

We will broaden the impact of our work in the Bahamas, and innovate in our faming model to create an even more scalable, more efficient way to grow the millions of corals we are hoping to grow in the near future. The award will also help us to jumpstart our development of other farms around the world."

Story: Kim Cloete

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UCT scientists celebrated as

SUPERHEROES who save the world

The SuperScientists programme aims to bring the achievements of scientists closer to children.

Imagine a world where children colour in pictures of their favourite scientist or dress up as a reallife researcher for costume days at school. Imagine a world where scientists are celebrated as much as Spiderman or the Black Panther. That world is here. University of Cape Town (UCT) researchers and academics are among the heroes of a programme that aims to bring the achievements of scientists closer to children, to inspire their interest in maths and science.

Two years ago, non-profit organisation (NPO) Codemakers started the SuperScientists programme, which has since been sharing the superpowers of science with children through an activity book, posters and calendars. Dr Justin Yarrow of Codemakers says they started the initiative to expose young people to scientists, while appealing to their love for comic heroes. "Representation matters; and so, when young people can't connect a name and face to these careers, it limits their imagination. Young people, for the most part, don't *know* a scientist. The image in their head is Einstein, a 'mad' scientist, and not someone they can relate to. The phrase 'You can't be it if you can't see it' is really quite true. Representation matters; and so, when young people can't connect a name and face to these careers, it limits their imagination to see themselves in them," said Dr Yarrow.

"Young people live in a world of superheroes, imagination and characters – whether on television, in books, or on social media. They are incredibly social; and yet when we teach science, we don't connect them to the people and characters who are doing the work," he added. "To date, we've made cards, posters, an activity book, and a calendar featuring our art and notable dates in science and technology in South Africa and beyond. More than 15 000 [items] of our materials have been given to young people, schools, community centres and clinics."

Representation in science

SuperScientists brings diverse faces to represent who scientists can be. It features scientists from across Africa, including Ghana, Uganda, Kenya, Botswana, Zambia and Rwanda. "Racial and gender inequity in science is a problem. It limits who becomes a scientist, and it limits young people when they don't see scientists who look like them," said Yarrow.

Oceanographer and UCT PhD candidate **Kolisa Sinyanya** is one such scientist; she has been depicted as superhero Nitro. In an activity booklet, she challenges children to find their way through a maze in the deep oceans. They also get to colour in a picture of her in a superhero costume, featuring a crown that says 'OCEANWOMXN'. And she's an achiever: Sinyanya is completing her PhD in Marine Biogeochemistry, and works with the Oceanography department's Dr Sarah Fawcett to examine and calculate the relationships between phytoplankton communities and nutrient cycling in the sunlit surface waters of the ocean. "Having little boys and girls colour in photos of Nitro, who is a character based on me, is mindblowing. It

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makes me proud to be the woman I chose to be today – a black woman who stands tall and speaks loudly about the science that I am so passionate about. I'm especially proud of my decision to have heeded the call to join SuperScientists, when Dr Justin Yarrow picked me from an 'ocean' of scientists to be Nitro," said Sinyanya.

"Initiatives like SuperScientists are key in society, because they create awareness that there are black and POC [people of colour] scientists out there in the various science fields. The series of educational materials additionally educates young and old about scientific concepts that surround us [but that] we hardly – or never – pay attention to. We are unapologetically addressing what we see that is lacking: representation."

While superhero Nitro looks after the oceans, Galactica – or Dr Rosalind Skelton – studies the stars. Dr Skelton is a Southern African Large Telescope (SALT) astronomer at the South African Astronomical Observatory, and an assistant lecturer at the UCT Department of Astronomy. Between helping to maintain and improve the telescope and studying its data, she lectures for the National Astrophysics and Space Science Programme at UCT, which trains postgraduate students in astronomy. Of being portrayed as a superhero, Skelton said, "It's a bit scary to put oneself out there and be described as a kind of superhero – not something I'm used to, as a scientist! I feel somewhat embarrassed, and proud at the same time. I'm happy to be sharing what I do in a novel way, and would be very happy if it inspires a child to follow their interests into a career in science. "It's a wonderful initiative that highlights the relatively unknown work being done in South Africa, in many very interesting areas of science. I like that it includes diverse fields, and I think it will open children's eyes to career options they may not have realised were possible. It provides role models who are real, local people, hopefully up-ending outdated ideas of what scientists look like," Skelton added.

Alumni excellence

There are also UCT alumni who have become SuperScientists – such as **Dr Mohlopheni Marakalala** (The Eradicator), who is an investigator at the Africa Health Research Institute; Professor Nombulelo Magula (Iron Heart), who is the head of the University of KwaZulu-Natal's Department of Internal Medicine; Dr Lenine Liebenberg (The Guardian), who is a scientist at the Centre for the AIDS Programme of Research in South Africa Mucosal Immunology Laboratory; and Dr Dimakatso Gumede (Checkpoint), who is a postdoctoral researcher in bioengineering and integrated genomics research at the Council for Scientific and Industrial Research (CSIR).

Dr Gumede, who graduated with a PhD that looked at the hereditary disorder of fibrosing poikiloderma, said her research at the CSIR now involves deriving immune cells (macrophages) and lung epithelial cells from induced pluripotent stem cells to identify potential treatments for inflammatory diseases. "We hope that some day in the future, a scientist will say that the spark that got them interested in science was one of images we've created. It's exciting to contribute to making science fun and enjoyable for children who are interested in it. Programmes like these help young people to pursue their aspirations of being future scientists, and [help them] to know that their dreams are valid and achievable," she said.

Nominations for SuperScientists have now closed, but people can continue to support the programme. "As a project that is trying to reach as many young people as possible, and showcase different fields and communities, we are trying to develop funding that will help us reach hundreds of thousands of young people, or even more. Hopefully we'll be able to secure that funding, and we can open nominations again," said Yarrow. He said people can sponsor or buy materials for their own children through the SuperScientists website. "We hope that some day in the future, a scientist will say that the spark that got them interested in science was one of the images we've created, and that it made them see science and scientists differently and helped them see that they could become scientists themselves."

Story: Wendyl Martin

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UCT alum presented with prestigious Whitley Award

South African conservationist and University of Cape Town (UCT) alum **Lucy Kemp** has received a prestigious Whitley Award worth over R790 000 to align traditional beliefs with new conservation action that will protect the Southern Ground-hornbill and its habitat. The Whitley Awards are presented annually to individuals from the Global South by the Whitley Fund for Nature, a charity based in the United Kingdom. Six conservationists were recognised for their commitment to conserving some of the planet's most endangered species and natural habitats.

During the celebration, they received messages of support from charity patron Her Royal Highness, The Princess Royal and charity trustee Sir David Attenborough. "Whitley Award winners are local environmental heroes, harnessing the best available science and leading projects with passion. I admire their courage, their commitment, and their ability to affect change. There are few jobs more important," said Sir Attenborough.

Kemp, who is one of the six conservationists, graduated from UCT with BSc, BSc (Hons) and MSc in Zoology. As the child of hornbill research pioneers, Kemp was taken on trips to breeding sites across Africa and Asia from just a few months old and spent her childhood surrounded by wildlife. Her successful early career in conservation led her to work on programmes to protect black rhinos, wild dogs and cheetahs before she returned to her roots and became project manager of the Mabula Ground Hornbill Project in 2010.

With her Whitley Award, Kemp will implement local custodianship outside of protected areas in South Africa. Custodians are trained to protect natural nests and install artificial nests where needed, which will improve breeding success. In addition, a network of citizen scientists, led by regional champions, will support an intensive national monitoring programme. Kemp will also document cultural beliefs, so that indigenous knowledge can be fully incorporated into conservation activities, as well as producing national roadmaps to recovery for Namibia and Botswana where the species is most threatened beyond South Africa.

"A magically wild childhood, filled with travel and exploration, instilled the belief in me that the careful balance of nature is truly precious. Most threats to species are caused by humans so it's important that we educate ourselves and learn how we can adapt our actions in order to better protect them. My work with schools and young people provides me with hope that the next generation will use their knowledge to live in harmony with our area's remarkable creatures," said Kemp.

About Africa's thunderbird

With its striking red-black-white colouring and rhythmic, drum-like call, the Southern Ground-hornbill is a long-lived and large-bodied bird. Valued culturally as the bringer of rain, the hornbill is said to have the ability to predict, signal and even command the summer rains and are believed to be so powerful that they can avert lightning strikes. Many farmers rely on sightings of the bird for a signal of when to prepare their land for crops and are growing increasingly concerned with their decline. Now endangered in southern Africa, the Southern Ground-hornbill has disappeared from 70% of its historical range. Cultural protection has kept some populations safe but downward trends continue – mostly on commercial farmland and some communal grazing areas where western influence trumps traditional beliefs.

Nest availability is a major factor in breeding success. The Southern Ground-hornbill is a territorial creature that needs its own space. If ideal nest sites are scarce, it will choose a sub-optimal site rather than leave its territory, which increases vulnerability to predation or flooding and limits chick survival.

Of Kemp's work and her community-based approach to conserving the Southern Ground-hornbill, founder of the Whitley Fund for Nature, Edward Whitley, said: "Lucy's passion continues to inspire so many people. Her work with communities to conserve the Southern Ground-hornbill – a cultural icon – is an example of the impact we can make collectively. Her family must be proud that she is able to carry on their pioneering research so this species survives. We are delighted to welcome Lucy into our network of Whitley Award winners."

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Research IN THE FACULTY

New study suggests falcons have natural 'eye makeup' to improve hunting ability

Dark 'eyeliner' feathers of peregrine falcons act as sun shields to improve the birds' hunting ability, a new scientific study suggests. Scientists have long speculated that falcons' eye markings improve their ability to target fast-moving prey, like pigeons and doves, in bright sunlight. Now research suggests these markings have evolved according to the climate; the sunnier the bird's habitat, the larger and darker are the tell-tale dark 'sun-shade' feathers.

The distinctive dark stripes directly beneath the peregrine falcon's eyes, called the malar stripe or 'moustache', likely reduce sunlight glare and confer a competitive advantage during high-speed chases. It's an evolutionary trait mimicked by some top athletes who smear dark makeup below their eyes to help them spot fast-moving balls in competitive sports.

Until now, there had been no scientific study linking solar radiation levels to the dark 'eyeliner' plumage, which is common to many other falcon species. A study, published recently in the journal *Biology Letters* was conducted by researchers from the University of Cape Town and the University of Witwatersrand. The scientists used photos of peregrine falcons from around the world posted on the web by bird watchers and scored the size of the malar stripe for each bird. They then explored how these malar stripes varied in relation to aspects of the local climate, such as temperature, rainfall, and strength of sunlight. The study involved comparing malar stripe characteristics, including width and prominence, of individual peregrine falcons, by using over two thousand peregrine photographs stored in online citizen science libraries. Researchers examined samples from 94 different regions or countries. Results showed that peregrine falcon malar stripes were larger and darker in regions of the world where sunlight is stronger.

"The solar glare hypothesis has become ingrained in popular literature, but has never been tested empirically before," said **Michelle Vrettos,** an MSc student from the Department of Biological Sciences at UCT who carried out the research. Vrettos added: "Our results suggest that the function of the malar stripe in peregrines is best explained by this solar glare hypothesis." **Associate Professor Arjun Amar** from the UCT FitzPatrick Institute, who supervised the research, said: "The peregrine falcon represents the ideal species to explore this long-standing hypothesis, because it has one of the most widespread distributions of all bird species, being present on every continent except Antarctica – it is therefore exposed to some of the brightest and some of the dullest areas around the globe."

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Orchid sexually exploits male beetles – a world first from Africa

Dr Callan Cohen, a research associate at the FitzPatrick Institute of African Ornithology, has discovered a world pollination first: an orchid that sexually exploits longhorn beetles. The near-extinct Disa forficaria, known from a single remaining plant in the mountains near Cape Town, mimics a female beetle so convincingly that the male beetle mates with the flower, thus pollinating it. Dr Cohen and a team of local and international researchers discovered an entirely new chemical system involved in this deception, and they are pioneering the process of using pollination to survey for the presence of critically endangered plants. These discoveries stem from Cohen's search for rare African orchids in the mountain ranges near Cape Town. Disa forficaria – a relative of the iconic Red Disa – was last seen in 1966, and only 11 of these plants have been found in the last 200 years, making it one of the rarest plants in the world. In an attempt to document the last known plant, Cohen aimed to take detailed photographs of it.

Deceived beetles

Incredibly, while I was observing, a beetle flew to the plant and clearly mated with it," he recalled. Orchids are known as deceivers; they mainly utilise food deception, by imitating plants with nectar despite having none. They have been found to use sexual deception on bees and wasps. But while beetles are the oldest known pollinators of plants, and the most diverse group of plant pollinators, this was the first clear case of a plant sexually deceiving a beetle.

Proving sexual deception

Cohen assembled a joint South African and international team to investigate the phenomenon, including UCT alumnus and world-famous pollination researcher **Professor Steven Johnson**; Adam Shuttleworth; UCT's Centre for Statistics in Ecology, Environment and Conservation associate **Dr Jonathan Colville**; and orchid experts William Liltved and Benny Bytebier.
Noticing that the beetle had a small, penis-like organ which it inserted into the modified lip of the flower, Cohen took several macro photographs of the flower just before the moment he predicted the beetle would get to the flower. Once it had, he found that it left something behind; the substance was tested, and conclusively showed sperm. "This is only the second time in the world that an insect has been found to ejaculate on a plant during pollination," said Cohen.

A new chemical system

Following this discovery, the researchers wanted to find out what chemical was attracting the beetle to the flower. They took a sample from the flower and caught a beetle to test in the laboratory. They found that the active chemical in the flower was what had attracted the beetle. The team sent the plant extract to a top chemist in Germany, the Max Planck Institute's Dr Ales Svatos, who identified the chemical involved and whose colleague, Dr Jerrit Weissflog, synthesised possible forms of its molecular structure. The chemical was a previously undiscovered macrolide, which the team named 'disalactone'. After testing the synthesised molecules in the field, the team found that the beetles all came to a particular form of the synthesised component, believed to be a mimic of the female beetle pheromone produced by the orchid.

A conservation world first

During their experiment with the synthesised molecules, they discovered that some of the beetles were carrying pollen (confirmed by genetic barcoding) from at least two other individuals of the *Disa*, proving the plant is not extinct. The team realised that they could now survey for the flowers by using the synthesised chemical to attract beetles that might carry evidence of the real orchids. "This resulted in narrowing down the area where the rare plants exist, and allows for a concentrated search for the orchid. Using pollinators to see if an endangered plant is present in the area is also a world first," said Cohen. "This discovery can help save the critically rare orchid, on the edge of extinction, with a novel chemical survey technique."

Way forward

Following these multiple discoveries, and the recent publication of Cohen and the research team's findings in Current Biology, pollination experts from around the world are studying the consequences and implications. The research findings of Cohen et al. also provide insights into long-horned beetle pheromones; the beetle's larvae burrow in wood and are thus important commercially. Finally, the research provides further perspectives into the biological function of macrolides, which are important components of many antibiotics.

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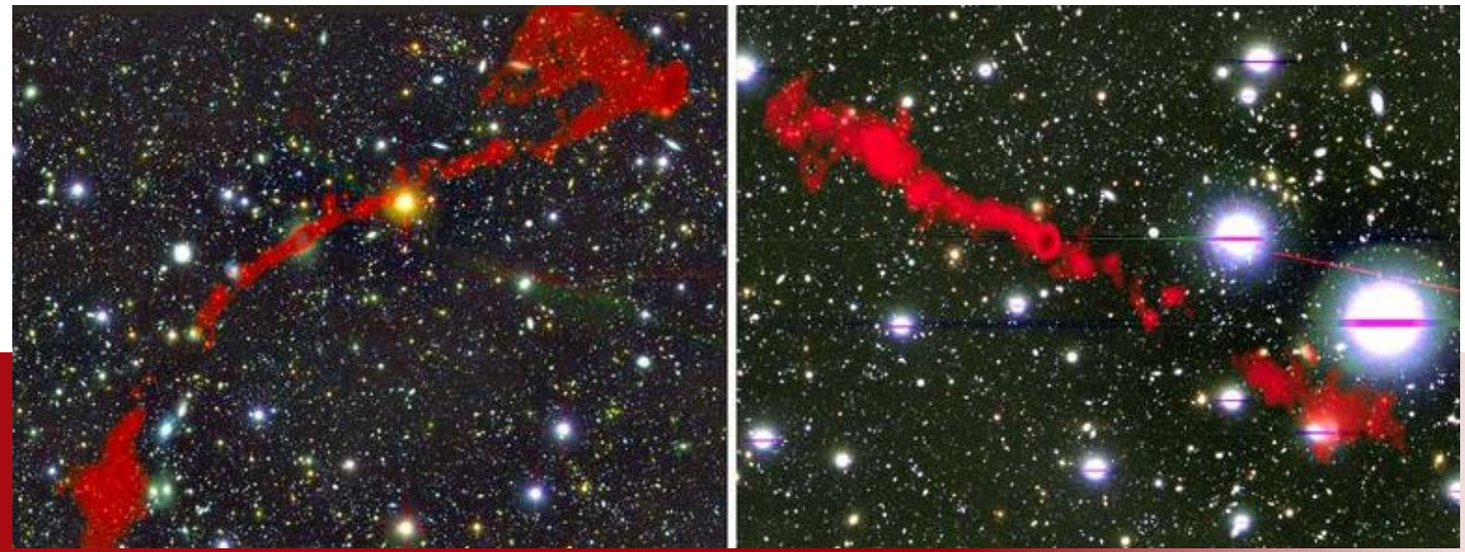
Gigantic galaxies discovered with the MeerKAT telescope



Two giant radio galaxies have been discovered with South Africa's powerful MeerKAT telescope. These galaxies are amongst the largest single objects in the universe and are thought to be quite rare. The discovery has been published online in the Monthly Notices of the Royal Astronomical Society.

The detection of two of these monsters by MeerKat, in a relatively small patch of sky suggests that these scarce giant radio galaxies may actually be much more common than previously thought. This gives astronomers vital clues about how galaxies have changed and evolved throughout cosmic history. Many galaxies have supermassive black holes residing in their midst. When large amounts of interstellar gas start to orbit and fall in towards the black hole, the black hole becomes 'active' and huge amounts of energy are released from this region of the galaxy.

In some active galaxies, charged particles interact with the strong magnetic fields near the black hole and release huge beams, or 'jets' of radio light. The radio jets of these so-called 'radio galaxies' can be many times larger than the galaxy itself and can extend vast distances into intergalactic space. **Dr Jacinta Delhaize,** a Research Fellow at the University of Cape Town (UCT) and lead author of the work, said: "Many hundreds of thousands of radio galaxies have already been discovered. However, only around 800 of these have radio jets exceeding 700 kilo-parsecs in size or around 22 times the size of the Milky Way. These truly enormous systems are called 'giant radio galaxies'." Delhaize said: "We found these giant radio galaxies in a region of sky which is only about four times the area of the full moon. Based on our current knowledge of the density of giant radio galaxies in the sky, the probability of finding two of them in this region is extremely small." "This means that giant radio galaxies are probably far more common than we thought!" Dr Matthew Prescott, a Research Fellow at the University of the Western Cape and co-author of the work, said: "These two galaxies are special because they are much bigger than most other radio galaxies. They are more than 2 Mega-parsecs across which is around 6.5 million light years or about 62 times the size of the Milky Way. Yet they are fainter than others of the same size. We suspect that many more galaxies like these should exist, because of the way we think galaxies should grow and change over their lifetimes." Dr Ian Heywood, a co-author at the University of Oxford, said: "The MeerKAT telescope is the best of its kind in the world. We have managed to identify these giant radio galaxies for the first time because of MeerKAT's unprecedented sensitivity to faint and diffuse radio light. "This made it possible to detect features that haven't been seen before. We found largescale radio jets coming from the central galaxies, as well as fuzzy cloud-like lobes at the ends of the jets." He continued: "We know that these galaxies are several billion light years away, and so it was the discovery of these jets and lobes in the MIGHTEE map that allowed us to confidently identify the objects as giant radio galaxies."

"The existence of the two MIGHTEE giant radio galaxies provides tantalising evidence that a large population of faint, very extended giant radio galaxies may exist," said Delhaize. "In the past this population of galaxies has been hidden from our 'sight' by the technical limitations of radio telescopes. However, it is now being revealed thanks to the impressive capabilities of the new generation of telescopes." "We hope to uncover more of these giant galaxies in the MIGHTEE survey as it progresses. We also expect to find many more with the future Square Kilometre Array (SKA) telescope. The SKA will reveal larger populations of radio galaxies than ever before and revolutionise our understanding of galaxy evolution."

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Ancient southern Kalahari
was more important to human evolution than previously thought...

- By Benjamin Schoville, Jessica von der Meden, Robyn Pickering and Wendy Khumalo

UCT researchers from the Departments of Archaeology and Geological Sciences are among an international team of researchers who studied and described a new archaeological site, Ga-Mohana Hill and found evidence for complex symbolic behaviours 105 000 years ago. The Kalahari is a huge expanse of desert in southern Africa, stretching across Botswana and into the northernmost part of South Africa's Northern Cape province.

The international team, made up of researchers from South Africa, Canada, the UK, Australia and Austria, has found evidence for complex symbolic behaviours 105,000 years ago. Humans use symbols as a shortcut to communicate important ideas. Identifying the ancient roots of symbolism is limited to what preserves over time. Large calcite crystals from several kilometres away were found in the cave alongside stone tools. Why the crystals were brought there is unknown; they are not modified and do not seem to have a functional purpose. They may have been collected for their aesthetic properties, or included in ritual activities. Crystals are collected by many people around the world to this day for ritual purposes. Early humans bringing crystals into Ga-Mohana suggests innovation in how people interacted with each other and their environment.

But such ancient innovation didn't occur in a bubble: there is context to when and where innovation occurs. What brought people there in the first place, at that time, to begin using those tools and collecting those crystals? Reconstructing past environments allows us to understand this context. And so, a major part of our research centred on working out what the area's climate was like 105,000 years ago. To do so, we looked at Ga-Mohana's rocks.

The southern Kalahari is often considered too arid to be important for human evolution. Our work contradicts the idea of an arid and empty interior. At some points, Ga-Mohana was much wetter than today, with pools of standing water and waterfalls tumbling down the hillside. The fact that the climate was very different then opens up possibilities about why this previously under-appreciated region must have played an important role in our species' evolutionary history. Archaeological and geological fieldwork allowed us to piece together this story.

Some kinds of rocks preserve traces of the past environment. The Ga-Mohana hillside is draped in deposits called tufa; these form from water leaking out of cracks in the bedrock. This occurs when underground aquifers are recharged with rain water and begin to overflow. Over time, these waters precipitate calcium carbonate and form tufa. The tufa system is no longer active, apart from small drips during the rainy season. But the fossil tufas represent periods in the past when there was more water available. To find out how old the tufas are and when these wet periods occurred, we used a method called uranium-thorium dating. Uranium is radioactive, meaning that it decays at a constant rate over time and produces 'daughter' elements; thorium is one of them. When tufa forms, uranium is 'locked' into the crystal structure and begins to decay to produce thorium.

The uranium-thorium system acts like a clock that starts when the tufa is formed. By precisely measuring how much uranium and thorium is in the tufa today, we use the known decay rate to calculate when the 'clock' started. This method is routinely applied to cave deposits like stalagmites and flowstones but has not been used very much on tufa. In the end, we dated two layers from an ancient tufa waterfall to between 110,000 and 100,000 years old . People were drawn to Ga-Mohana for many reasons. Surface water would have been one. The many ostrich eggshell fragments we also found were probably used as water carriers 105,000 years ago. Perhaps these were being filled with water as it flowed down the hillside. One possibility is that water carriers allowed our ancestors to travel further distances. There is still more to be learned from Ga-Mohana, its artefacts and its rocks. This will allow scientists to understand the role this space played in human evolutionary history better.

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Uncovering the mysteries of manta ray communication

Based on brain-to-body size ratio, manta rays could be considered the most intelligent fish species in the ocean. But does their behaviour confirm this physiological hypothesis? A collaborative study conducted by researchers at UCT, Macquarie University, the University of Papua and the Marine Megafauna Foundation suggests that the answer to this question may lie in the devil fish's horns.

When they were first described in the late 1700s, manta rays were given the unfortunate moniker of 'devil fish' as a result of the horn-like protrusions on either side of their mouths—presenting a stark contrast with their rather gentle temperament and unassuming social behaviour. Despite the sinister connotations, these horns - known as cephalic fins/lobes - are typically used for the simple task of funnelling zooplankton into the manta's mouth while feeding. However, a study recently published in *Behavioural Ecology and Sociobolgy* suggests that cephalic lobe movements may also be important in social communication or sensing the local environment.

Michelle Carpenter, a PhD student in the Department of Biological Sciences, and one of the lead researchers on the project, has spent the past four-going-on-five years becoming closely acquainted with these rays. "My first interaction with a manta in Africa was in 2016 at Tofo in Mozambique," she recalls. "It was really far away, but when it spotted me, it came right up close and looked straight into my eyes. I just remember thinking 'This animal is really smart.'" Carpenter was instantly hooked and decided to dedicate her postgraduate studies to finding out more about this particularly charismatic species, which it turns out, is still relatively understudied. This has meant spending hundreds of hours closely scrutinising their behaviour – both in the field and by watching video recordings.

Michelle collaborated with Dr Rob Perryman, a manta behavioural biologist. His previous studies had revealed, among other things, that reef manta rays are social animals, with individuals recognising and remembering their preferred 'friends' and mates. Importantly, Perryman has also built up a formidable library of manta ray footage that has proved invaluable to the study. Together, Carpenter and Perryman developed a standardised method to assess manta ray behaviour in the wild via focal sampling and frame-by-frame video analysis. "Small flicks of the lobe tips were performed more frequently when rays were facing another individual, while tight rolling of the lobes was associated with being followed by others. Some lobe movement types were also made more frequently when interacting closely with cleaner fish and may be used to attract their attention." While the study shows strong evidence for mantas using their cephalic lobes for sensing, Carpenter says that they still require further evidence to confirm their use in communication. "I believe we will be able to confirm this eventually," she says. "The thing with animal behaviour is there's so much going on, so much stimuli around them. So, the challenge is isolating certain stimulus." The next step in this regard would be acquiring footage of manta rays when they aren't feeding or being cleaned, which is no mean feat.

Carpenter will continue this research by focusing on the behaviour of manta ray populations in Mozambique and has enlisted the help of UCT honours student, Hannah Stewart.

Although the connection between a manta ray's cephalic fins and conservation of the species may seem tenuous, Carpenter believes that discovering more about the intricacies of animal behaviour is key to inspiring a sense of curiosity about and respect for other species among humans.

"If people realised how smart and complex animals are, they'd be more inclined to protect them," she says.

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Ships are illegally dumping plastic bottles

on South African beaches, study finds

A new study by researchers at the UCT's FitzPatrick Institute of African Ornithology and Nelson Mandela University found that ships are a major source of plastic bottles littering South African beaches. The ndings, just published in the journal Environmental Pollution, also show that some bottles drift across the Indian Ocean from countries in southeast Asia, especially Indonesia.

The researchers collected bottles and other single-use containers at 32 beaches around the South African coast to infer their sources based on their age and country of manufacture. Most bottles were plastic, despite well-developed recycling initiatives for polyethylene terephthalate (PET) and high-density polyethylene (HDPE) bottles in South Africa. "The problem is that we produce so many single-use bottles in South Africa that even the relatively high recovery rates achieved translate into billions of bottles not being recycled" said lead researcher **Professor Peter Ryan**. Bottle densities were greatest at urban beaches, where most come from local, land-based sources. Street litter in Cape Town and Gqeberha was dominated by bottles made in South Africa (99%), with foreign-manufactured bottles increasing from urban (4%) through semi-urban (24%) to remote beaches (45%).

Foreign bottles were most common at beaches in De Hoop Nature Reserve and the Namaqualand National Park, where more than 70% were from other countries. "Almost all foreign bottles were PET water bottles from China and other Asian countries, with smaller numbers from South America and Europe. This fact, coupled with their recent manufacture dates, indicates that most foreign bottles are dumped illegally from ships," said Ryan. "Bottles from nine countries on four continents were found within three months of the date of manufacture – they simply couldn't have drifted here that quickly."

Dumping of plastics at sea has been banned since 1989, but clearly many ships are still ignoring these regulations. The study calls on the International Maritime Organisation to tighten regulations to ensure that ships use port reception facilities for such waste, rather than dumping their rubbish at sea. Unlike PET drink bottles, foreign HDPE bottles were more common along the southeast coast of South Africa than along the west coast, consistent with many of these bottles arriving by long-distance drift across the Indian Ocean from southeast Asia. The most common country of origin for these bottles was Indonesia, and most newly-arrived HDPE bottles were 4–6 years old.

Ryan said the study confirms that the east coast of Africa and adjacent island nations receive large amounts of buoyant litter leaking into the sea from southeast Asia, and especially from Indonesia.

"It is widely assumed that 80 per cent of plastic pollution in the sea comes from land-based sources. However, this figure is a very crude estimate and it is clear that the proportion varies depending on where you are. Our recent work has shown that much land-based litter doesn't disperse far from where it enters the sea. Bottles offer a useful way to track litter origins because they contain information on when and where they were manufactured," shared Ryan.

Beaches are key attractions for tourism and recreation, and considerable effort is made to keep beaches clean, yet many beaches still have substantial litter loads. To tackle beach litter in South Africa, Ryan says we need to greatly reduce plastic leakage from land-based sources, both locally and in southeast Asia, as well as improve measures to prevent the illegal dumping of plastics and other persistent wastes from ships.

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Tiny pterosaurs dominated Cretaceous skies

Scientists from the universities of Cape Town, Portsmouth, Leicester and Casablanca have found that the newly hatched juveniles of large and gigantic pterosaurs likely outcompeted other smaller adult pterosaur species to dominate the Late Cretaceous period around 100 million years ago.

Pterosaurs were the flying cousins of dinosaurs – some were as large as a Spitfire fighter plane and others as small as a thrush. During the Triassic and Jurassic periods, 252 – 145 million years ago, pterosaurs reached only modest sizes, but by the Late Cretaceous period many were giants – some with a wingspan of 10 metres or more. It had been previously thought that the smaller species of pterosaurs were outcompeted by newly evolving birds, but this research has found that it was actually the babies of giant pterosaurs - known as flaplings - who overshadowed their small adult rivals.

Co-investigator, **Professor Anusuya Chinsamy-Turan**, from the Department of Biological Sciences at UCT, is a world expert on the bone microstructure (histology) of pterosaurs and dinosaurs. She said: "By looking at the paper-thin sections of the bones under a microscope, I could tell that they were from juveniles as the bone was fast growing and didn't have many growth lines. We also examined the surface of the bones and found they had a rippled texture. This was further evidence they were the bones of immature individuals as mature pterosaur bones have an incredibly smooth surface once they are fully formed."

Roy Smith, from the University of Portsmouth said: "Over the last 10 years or so, we've been doing fieldwork in Morocco's Sahara Desert and have discovered over 400 specimens of pterosaurs from the Kem Kem Group, highly fossiliferous sandstones famous worldwide for the spectacular dinosaur *Spinosaurus*. "We'd found some really big pterosaur jaws and also specimens that looked like smaller jaws - about the size of a fingernail - but these tiny pterosaur remains could have just been the tips of big jaws so we had to do some rigorous testing to find out if they were from a small species or from tiny juveniles of large and giant pterosaurs." Roy and his colleagues examined five small jaw fragments and a neck vertebra using sophisticated microscope techniques to determine the age of the individual when the animal died.

The researchers also inspected the jaws and found that the number of tiny holes where nerves come to the surface for sensing their prey, known as 'foramina', were the same in the small jaws and the big jaws.

"This was more proof we were looking at the jaws of juveniles because if the specimens were just the tip of a jaw, there would be a fraction of the number of foramina," said Roy.

Recent findings have suggested that hatchling pterosaurs could fly soon after hatching so they were quickly independent. Professor David Martill of the University of Portsmouth said: "What really surprised me about this research is that the feeding ecology of these magnificent flying animals is more like that of crocodiles than of birds. "With birds, there will be perhaps 10 different species of different sizes alongside a river bank - think kingfisher, little bittern, little egret, heron, goliath heron or stork for a large European river. There are several species all feeding on slightly different prey. This is called niche partitioning. "It's likely that the juvenile pterosaurs were feeding on small prey such as freshwater insects, tiny fishes and amphibians. As they grew they could take larger fishes - and who knows - the biggest pterosaurs might have been capable of eating small species of dinosaurs, or the young of large dinosaur species." said Martill.

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Explaining the super-groups of humpback whales on the west coast of South Africa

Over recent years since 2011 and apparently at random, super-groups of humpback whales (Megaptera novaeangliae) ranging from 20 to 200 have been observed in the coastal region of the Southern Benguela current between St Helena Bay and Cape Point on the west coast of South Africa.

The sightings have been reported since then by several members of the public during the months of October, November and through to December. This occurrence is unique as while humpback whales in the Southern Hemisphere are well known for their annual migrations between the summer high-latitude Southern Ocean feeding grounds and the winter mating and calving grounds in low-latitude, tropical and subtropical coastal waters, the feeding strategy of such densely packed feeding individuals is unprecedented in this region (at such low latitudes ranging from 32.5°S to 34.5°S). Globally it has also been unprecedented until recently when super-groups have been reported in Australia too.

A new study co-led by **Dr Subhra Prakash Dey** and **Associate Professor Marcello Vichi** from the Department of Oceanography at UCT and the *Marine and Antarctic Research Centre for Innovation and Sustainability (MARIS*), aimed to understand this phenomenon. In collaboration with an international team of marine mammal experts, marine biogeochemists, and numerical modellers, they combined satellite observations and a physical ocean model to understand environmental drivers of this occurrence in the Southern Benguela Upwelling System (SBUS) off South Africa.

Dey shared: "The formation of super-groups in recent years suggests that there might be a change in oceanographic or ecological characteristics which provide the conditions for this novel feeding strategy in the SBUS." The team found that the most prominent necessary condition for the occurrence of super-groups was the occurrence of a higher-than-normal phytoplankton bloom (development of a level of phytoplankton biomass that is uncharacteristically high for a given water body) during the month of October, and within one month prior to super-group events, ie a large phytoplankton bloom occurred around one month prior to each supergroup occurrence. However, this condition alone is not sufficient: changes in the typical northward and eastward transport of waters in the Cape Peninsula along-shore jet current are also required. This change is a reduction in the flow of water during the month of October, which leads to higher retention of the phytoplankton bloom.

"This study provides evidence of causal events that would allow researchers and the whale watching industry to prepare for super-group occurrences at least one month in advance." Both the retention and high chlorophyll concentration, which is used to measure phytoplankton abundance, are found to be significantly higher in October in 2011, 2014 and 2015 compared with other years. According to the team, the combination of a phytoplankton bloom and a reduction in water volume export from the area in October leads to an increase in secondary production and high concentrations of the humpback whales' prey. "Though the detailed atmospheric and oceanographic settings explaining the origin of these anomalies remain unknown, this study provides evidence of causal events that would allow researchers and the whale watching industry to prepare for super-group occurrences at least one month in advance, through the evaluation of chlorophyll and retention indices derived from satellite data and ocean models," explained Vichi.

"Given the upcoming season of possible super-group occurrences, we call for citizen science reports to help us better frame their distribution along the coast." The research is part of the Whales & Climate programme, an interdisciplinary approach to understand the impacts of climate change on the recovering population of humpback whales. Access the study "Oceanographic anomalies coinciding with humpback whale super group occurrences in the Southern Benguela" online.

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The ancient African plant that captured Armani's attention

Although it's widely used in African traditional medicine, modern science is only beginning to appreciate the remarkable pharmaceutical and cosmetic applications of the plant Myrothamnus abellifolia. This is why designer, Giorgio Armani, chose it as the main ingredient in his skincare range, Crema Nera. Known as Uvukakwabale in isiZulu, Umazisi in isiNdebele and Mufandichumuka in Shona, M. abellifolia is believed to be one of the most ancient plants on our planet. Its name in the indigenous languages where it grows translates roughly as "awake from the dead", an appropriate name for a plant that can dry out almost completely and survive.

For **Professor Jill Farrant**, professor of molecular and cell biology at UCT and scientific advisor to Giorgio Armani, it is vital that as we learn more about this plant's valuable properties, we also ensure its harvesting is sustainable and that the communities from where it comes benefit from its use.

Today, a high proportion of papers published about resurrection plants are from Farrant's laboratory, a relatively under-resourced facility compared to those of her colleagues in Europe. "But I am lucky," says Farrant. "Of the 135 resurrection plants that exist, only three or four grow in Europe. The rest are in Africa.

Resurrection plants are known for their ability to 'play dead'. They can lose up to 95% of their water and look completely dead, only to bloom to life again in as little as 12 hours after rain.

"What makes resurrection plants in general, and *M. flabellifolia* in particular, so special," she explains, "is the remarkable toolbox of chemicals they use to survive the extreme water loss and heat that would kill any other plant. It is these phytochemicals that serve as powerful antioxidants we can use for pharmaceuticals and cosmetics. The major antioxidant in *M. flabellifolia* protects cell membranes from damage at the microscopic level – more effectively than vitamin C. Antioxidant activation can defend cells against damage caused by pollution, UV rays, dehydration, free radicals and temperature extremes, all of which accelerate skin ageing." *M. flabellifolia* contains the greatest number of antioxidants Farrant has ever seen in a plant, more so than so-called wonder plants like rooibos and aloe vera.

M. flabellifolia grows on rocks which it breaks down to make soil. And while the species can be grown *en masse* in greenhouses, studies have shown this changes the composition of the plant. In other words, when it does not need to produce strong antioxidants to survive, it doesn't. As interest in this plant grows, so too does the risk of extinction if it is harvested unchecked. Farrant is thus working to ensure steps are taken to protect this valuable botanical resource and remunerate the communities living with it.

As yet, South Africa does not export *M. flabellifolia* and Armani sources the plant from Zimbabwe, in large part because that country sells the product internationally at a very reasonable cost. As a condition of her role as scientific advisor, Farrant has requested that the plants are not sourced from South Africa unless there is investment into studies for sustainable harvesting, Despite not yet securing industry funding, Farrant has initiated studies to measure the growth and reproductive rates of *M. flabellifolia*, which will in due course provide sustainable harvesting practises. Farrant is also working to ensure the farmers who will grow the plant are remunerated in accordance with its value and that royalties are paid to the elders of the communities who first discovered its medicinal properties.

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Firsts FOR THE FACULTY

Archaeology: 1st Science Department with black staff majority

The University of Cape Town's (UCT) Department of Archaeology has marked a major milestone by becoming the first department in the Faculty of Science with a black staff majority. This follows the appointments of alumni Dr Vuyiswa Lupuwana and Dr Yonatan Sahle.

Dr Lupuwana and Dr Sahle, an Ethiopian national, are also new members of the Human Evolution Research Institute (HERI). The faculty's deputy dean for transformation, **Professor Rebecca Ackermann**, a member of the Department of Archaeology and the deputy director of HERI, added, "This achievement is especially notable in a discipline that researches the deep past and heritage of Africa, yet has been dominated historically by white, mostly male, academics." **Dr Deano Stynder,** the new interim head of the Department of Archaeology and also a black staff member, endorsed the importance of diversity to innovation – the lifeblood of universities and research. "Archaeology is a notoriously untransformed field and over the years this has stymied progress. With the appointment of these two outstanding young academics, we have not only managed to consolidate our position as one of the leading archaeology departments on the continent, but also to strengthen the field in general."

Vuyiswa Lupuwana: I am a historical archaeologist. Broadly speaking, this means that I focus on the archaeology of the last 500 years. I am interested in how indigenous communities in southern Africa experienced and negotiated the processes of contact, interaction and colonialisation. My research has largely been based in the Northern Cape, a region of South Africa [where the] frontier interactions provide fertile ground to explore issues of interaction, and the change and continuity of belief, cosmologies and society. Consequently, I've focused primarily on frontier communities such as the Khoekhoe, San, Xhosa and Trekboers [nomadic pastoralists; forerunners of the Voortrekkers]. My work is further situated around the period of industrialisation and the spread of capitalist monopolies in southern Africa. The period of industrialisation is key to understanding contemporary South Africa, in terms of race and identity politics and the construction of our modern society. This kind of research is necessary to the processes of nation building. Historical archaeology is a powerful tool that enables one to interrogate micro-historical processes – and accessing and interrogating these processes offers a platform to address issues around social justice. As an undergrad, I majored in film and media production in addition to archaeology, and I've had a number of opportunities to combine these interests. One of my passions is to make sure that my archaeological research is actively available to the communities I work with and society as a whole, and

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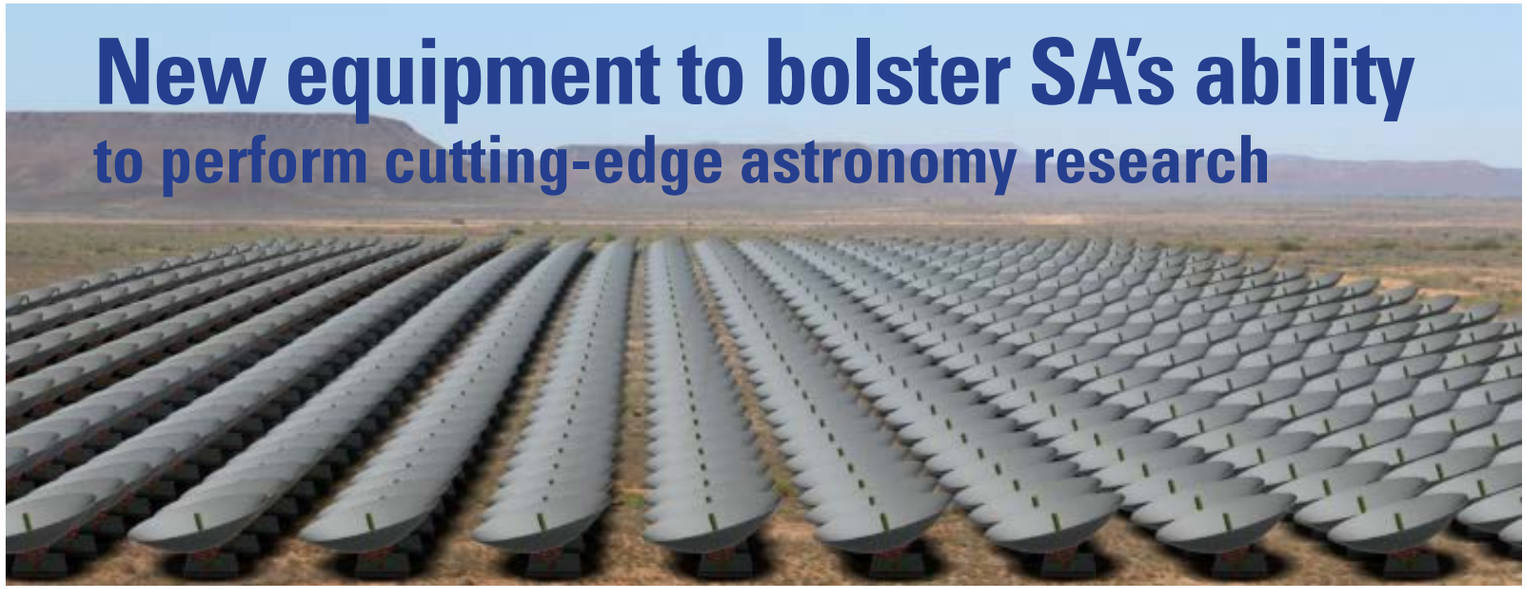
Continued... **Archaeology: 1st Science Department with black staff majority**

so I work on documentaries around heritage and identity, as well as projects focused on bringing communities into the heritage storytelling process through digital film-making workshops.

Yonatan Sahle: I am a broadly trained archaeologist with research interests spanning different time periods and topics. My main research, however, revolves around understanding evolutionary contexts across the origin of our species. Specifically, my current research seeks to address the following questions: What role did environmental change have in the development of nuanced technologies and behaviours – and anatomical features recognised as uniquely Homo sapiens – across the later Middle Pleistocene? What do the trajectories of such technological, behavioural and anatomical shifts look like locally, sub-regionally and regionally?

I believe that the strength of our answers to these and related questions lies in our ability to closely study sites that sample the critical period dating to 500 000 to 300 000 years ago. Such sites are extremely sparse on the continent. Thanks to my focused surveying efforts over the past several years, we have recently discovered new sedimentary contexts that sample this period of interest. Our initial works there have already yielded exciting hominin, faunal and archaeological discoveries that are currently being closely studied. With these ongoing collaborative research efforts, we will soon be able to make major contributions to addressing important outstanding questions about the origins and evolution of our species and associated behaviours.

New equipment to bolster SA's ability to perform cutting-edge astronomy research



The National Research Foundation (NRF) has approved the funding of R35 million for the Hydrogen Intensity and Real-time Analysis eXperiment (HIRAX) which will be built as a guest instrument on the South African Radio Astronomy Observatory's (SARAO) site in the Karoo. This follows an intensive and rigorous review process involving international experts. The new equipment will bolster the country's ability to perform cutting-edge astronomy research in alignment with the Grand Challenge Astronomy National Strategy. This new investment by the Department of Science and Innovation, in partnership with the NRF, will provide funding for the telescope dishes, feeds, radio frequency over fibre system, and some backend hardware. This contribution represents a significant investment in the overall HIRAX project.

This state-of-the-art telescope will provide large astronomy data sets to the project's consortium members, international partners, and project collaborators. **Professor Amanda Weltman**, of UCT's Department of Mathematics, who is part of the project shared: "This is a major milestone for HIRAX, a locally led experiment that holds the potential to solve some of the most challenging and interesting problems in cosmology and astrophysics today." South Africa has a long history of successful astronomy telescopes, and the future Square Kilometre Array (SKA), which will be hosted by both South Africa and Australia, is set to be the largest radio telescope in the world. HIRAX will provide training and skills development in anticipation of the SKA era while studying cutting-edge questions in the fields of dark energy, fast radio bursts, and pulsar science. The telescope is currently funded to be an interferometer array of 256 closely packed dishes that will provide an unprecedented peek into the history of our universe. There are also plans for possible future expansion to 1 024 dishes.

Reflecting on the NRF's University Flagship Programme which aims to provide customised, innovative solutions and institutional support in a way that recognises the unique strengths and niche research areas of public universities, Dr Gansen Pillay, the acting CEO said: "This investment in Strategic Research Equipment will further advance postgraduate student training, new knowledge generation and South Africa's standing as a global leader in the field of astronomy."

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'Climate Frontiers' podcast: Connecting science and society

In their podcast series, *Climate Frontiers*, the Climate System Analysis Group (CSAG) at UCT presents an accessible perspective on topics often hidden behind academic language, connecting science and society for positive change. Through conversations with researchers at the CSAG, and occasionally with partners across Africa and internationally, the climate research centre discusses a range of topics from within physical climate science, through to social science and philosophy.

In the first episode, "The Ethics of Climate Services", PhD candidate **Jessica Lee** is in discussion with the CSAG's deputy director, Dr Christopher Jack; the Department of Environment, Forestry and Fisheries' Tlou Ramaru; and the South African Weather Services' Dr Tracey Laban. The three interviewees were all involved in a recent project exploring some of the challenges at the intersection of climate services and ethics.

The second episode, "The Complex Challenge", is a conversation between **Dr Anna Taylor** from UCT's African Climate and Development Initiative, and climate scientists **Professor Bruce Hewitson** (CSAG director) and Dr Izidine Pinto (CSAG researcher). They discuss why climate change is such a complex problem and what the CSAG and others are doing to make sense of the complexity to help make climate information clearer, more accessible and usable or actionable by those confronting climate risks.

In the third episode, "CORDEX-AFRICA", the focus is on Coordinated Regional Downscaling Experiment (CORDEX) – and, in particular, CORDEX-Africa and the role it has played in developing the capacity of African scientists to conduct climaterelated research in Africa. It features CSAG researcher **Dr Chris Lennard.**

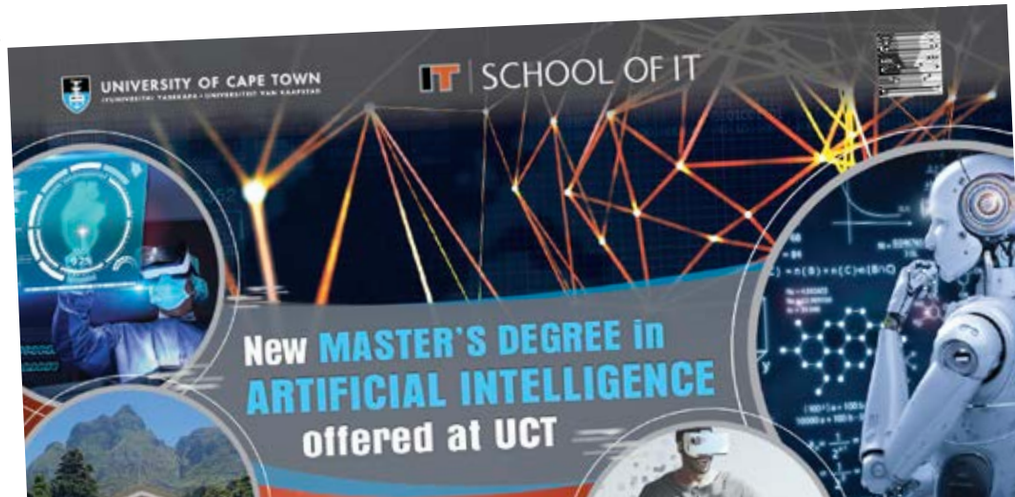
New Master's degree in Artificial Intelligence at UCT

Artificial Intelligence (AI) already shapes our everyday lives and has the enormous potential to both solve complex industrial and social problems and create new and innovative products and solutions. However, many organisations are still grappling to understand the relevance and future impact of AI on their activities, and what they should be doing about it. This is one of the pressing issues to be addressed by the new Master's degree in AI, to be offered by the Department of Computer Science at the University of Cape Town from 2022.

The new degree will complement the current Master's in Computer Science by introducing students to a broad base of AI and Machine Learning (ML) techniques, ranging from classical logic and ontologies to statistical approaches, biologically inspired AI, and natural language processing. The degree will offer an array of modules on various AI topics, as well as a dissertation component, enabling students to immerse themselves in a specific AI research topic under the supervision of one of UCT's AI experts in the Computer Science department.

This specialisation in AI further aims to provide practical training in doing scientific research that makes substantial and significant research contributions, as well as building theoretical knowledge on a broad range of topics in AI, and solving critical research problems that contribute to, and advance the state of the art in the overall field of AI. The University of Cape Town is one of only a few tertiary institutions in South Africa that offers a Master's degree in AI with coursework and a dissertation component.

Applications for 2022 are now open and will close on 30 September 2021. Further information about the degree and application procedure is available at: http://www.sit.uct.ac.za/sit/postgrad/masters-ai



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SA must harness the power of human and veterinary medicine before the next deadly virus strikes

- By Profs Ed Rybicki, Anna-Lise Williamson and Baptiste Dungu

The kinds of emerging zoonotic disease agent that concern One Health include, among others, those that move from wild to domestic animals then go on to be transmitted long-term between humans. A One Health approach to vaccine development has many strengths, including for health and food security on the continent. But this country needs to boost its capacity now, write Professor Ed Rybicki and Professor Anna-Lise Williamson from the University of Cape Town and Baptiste Dungu, the chief executive of Onderstepoort Biological Products.

The need for next-generation animal vaccines coupled with the threat of future pandemics, points to the need for a One Health approach to developing jabs – besides, most major human vaccine makers owe their strength to having both human and veterinary vaccine capacity. The One Health initiative is "dedicated to improving the lives of all species – human and animal – through the integration of human medicine, veterinary medicine and environmental science". The importance of the approach can be seen when one realises that six out of every 10 infectious diseases in humans are zoonotic (spread from animals) and seven out of 10 of emerging or re-emerging infections are vector-borne or zoonotic. There is particular interest in developing low-cost products for point-of-care diagnostics that could also be used as vaccines for animals and possibly for humans, since these diseases mainly affect people and animals in developing countries and resources to study them are often lacking. In addition, commercial reagents are frequently not available or excessively expensive for low-resource countries and are not available in times of crisis such as the Covid-19 pandemic.

A One Health approach to vaccine development has several strengths. In fact, the majority of major human vaccine manufacturers owe their strength to having both human and veterinary vaccine capacity (Pfizer, before spinning out Zoetis; Sanofi and Merial, Bayer, Eli Lilly, Novartis). Furthermore, emerging economies such as India and China have been building their vaccine industries by capitalising on knowledge from the two sectors. It is quicker and cheaper to assess new vaccine technologies, adjuvants, toxicity and immunogenicity in animals before employing the technologies for the manufacture of human products. One good example is the Indian biopharmaceutical organisation Indian Immunological. Its animal vaccine facility is also in a parastatal established by the Indian National Dairy Development Board and corporatised the same year (1999) as South Africa's only veterinary vaccine manufacturer, Onderstepoort Biological Products. By leveraging these facilities and expertise, they established a very successful human vaccine capacity. Their rabies vaccine, which was initially veterinary, was subsequently developed into a human vaccine. They now produce a larger range of human vaccines, generating significantly more revenue than the animal vaccine unit – and are even working on a Covid-19 vaccine. The human vaccine unit has been established at a regulated distance from the animal vaccine facility, but on

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Continued... **SA must harness the power of human and veterinary medicine before the next deadly virus strikes**

the same large property owned by the company. The research and development unit and other services are shared, with the agreement of regulatory authorities, which is the case in other parts of the world

South Africa has excellent capacity and facilities for advanced research on and laboratory-scale production of reagents and candidate vaccines. These include university- and parastatal institute-based research groups and their labs, and technology for live viral vectors, sub-unit protein production, and laboratory animal testing. What it lacks are large animal facilities for testing veterinary vaccines, and pilot-scale current Good Manufacturing Practice-compliant manufacturing facilities, and one or more facilities capable of producing human vaccines in the country. Given the need for next-generation animal vaccines for Africa combined with vaccine preparedness for the next pandemic, building One Health vaccine capacity makes sense, and will be to the advantage of health and food security in Africa. And we need to establish this capacity now, before "virus Y" comes along.

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Even if Covid-19 vaccine IP is waived,

Africa does not have the capacity to produce at scale

Professor Kelly Chibale, from the Department of Chemistry, says that if the intellectual property (IP) rights of vaccines are lifted, the African continent will still not be able to scale up the production of Covid-19 vaccines.

Countries and activists in the Global South have been asking pharmaceutical companies to waive IP rights on the Covid-19 vaccine for more equitable access. Professor Chibale, a professor of organic chemistry and founder of the integrated drug discovery and development centre H3D, said IP was necessary because it was an enabler of innovation. "First of all, when people talk about IP rights they are not just rights but also responsibility. If you file a patent on something, you have a responsibility to move that innovation. People need to have the know-how and means to move that innovation.

"Why is IP necessary? IP is actually an enabler. Something went into that innovation, someone paid cash [for it]. It really helps to create strong innovation systems. It provides incentives." Chibale said even if the IPs were waived immediately, the African continent would still not have the capacity to manufacture the vaccines for a fast rollout. "Even if the IP was waived, I guarantee to you that it would mean nothing. How are we going to do it? We don't have the facilities to do this at scale. We don't have the expertise, the knowledge, the infrastructure. People need to balance the IP issue with reality."

Vaccine manufacturing capacity

He added there were only about 10 African manufacturers that have the capability to produce vaccines. They are based in only five countries - Egypt, Morocco, Senegal, South Africa and Tunisia - and mostly fill and package the vaccines. He asked the question: How can the whole continent have less than 10 countries that can manufacture vaccines for different diseases? We have to address that. The challenge is that as long as you are not doing your own manufacturing, access is going to be a challenge. "If we can manufacture the vaccines in South Africa, it brings efficiency in terms of access." Chibale said by manufacturing locally, governments were able to prioritise their citizens. Chibale added that another challenge would be how to scale up production using existing infrastructure and getting the funding to do so. "It really is important that we remember that we already have infrastructure that has been used for decades to basically roll out vaccines. There's also a case for new ways of funding. How the Ebola crisis was handled has provided a blueprint of how we can come together."

He stressed that as long as not all countries vaccinated their populations, the pandemic would not end. "South Africa is not safe unless all the countries on the African continent are safe. The sooner the vaccine can get here before the virus gets ahead of us, the better. If we don't do this quickly enough as a global community, it'll have serious consequences."

The UCT Mathematics Competition 2020-2021: Overcoming Covid-19 Challenges

- By John Webb

For the first time since it began as a school-based event in 1977, the annual UCT Mathematics Competition could not be held in 2020. Covid had locked down the campus and schools were closed. Towards the end of 2020 a hopeful date was set to host the competition at UCT: Tuesday 4th May 2021. The date looked ideal: it was in the UCT midterm vacation and also in the school term. All the usual venues at UCT were booked, and the unused 2020 papers had only to be lightly edited for use in 2021. However, UCT was still restricting social contact by severely restricting the numbers allowed in its venues, and accommodating over 7000 high school students was impossible. The suggestion of taking everything online was quickly dismissed, since it would have excluded many township and rural schools with inadequate internet and IT access. The decision was reluctantly taken to move the competition into the schools.

Many schools were sorry that their pupils would not experience visiting UCT, exploring the campus to find their venues and enjoying the buzz of discussion with thousands of other maths enthusiasts afterwards. There were, however, some advantages: on-campus participation has always been limited by the capacity of UCT venues, and in-school participation meant that schools could be allowed to double the number of their entries. Another plus was that some of the more remote country schools who could not afford to bus their school teams to UCT were able to take part in the competition for the first time.

The question papers were couriered to schools on Monday 3rd May, and next day nearly **7000 pupils in 133 schools** across the Western Cape wrote the papers at the same time. Their answer forms were couriered back to UCT the next day and processed by UCT's data capture office. All courier charges were paid by UCT. With all answer forms captured, marked and analysed, schools were sent their results. The next step was organising the follow-up rounds. The top 150 participants (30 per grade) were invited to the take part in the UCT Mathematics Challenge. The Challenge paper consisted of just 10 problems, at a level above the multiple-choice competition problems, but requiring only numerical answers and no working. Restrictions on social gatherings were still in force, preventing hosting the Challenge at UCT, and the papers were written in the schools on Thursday 24th June. Answer forms were scanned and emailed back to UCT where they were quickly marked, with full results announced on Monday 31st May. It was just in time. Tighter Covid restrictions were announced, and schools were closed for early school holidays two days later.

The top achievers in the Challenge will be invited to write a traditional full Mathematics Olympiad paper, requiring written solutions with full reasoning for six difficult problems, at a level way above school exams. The 3-hour Olympiad paper is usually written on a Saturday afternoon at UCT, and although the number writing will be between 50 and 100, the most difficult problem of all is to work out if and when and where to host the Olympiad. The Prize Giving will follow the Olympiad round, when we hope to welcome some 500 prize winners, parents, teachers and sponsors to the Baxter concert Hall to applaud the recipients of certificates, prizes and trophies.

Since 1980, a core feature of the UCT Mathematics Competition, Challenge and Olympiad programme has been the social impact of bringing together top young mathematicians in friendly competition at UCT, getting to know the campus over their five high school years and meeting staff of the Department of Mathematics. For UCT, it has always been a most successful exercise in public relations and recruitment of top students.

Thanks go to the Problem Committee chaired by Thomas van Heerden and comprising schoolteachers Francois du Preez, Bronwyn Adonis and Neil Eddy, and UCT staff Renee Rix, Haris Skokos and John Webb and new member Neil Eddy. Overall financial support by the Capitec Foundation ensures that participation in the Competition, Challenge and Olympiad is free.

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UCT hosts SA team for International Olympiad in Informatics

- By Michael Cameron, IITPSA Olympiads Liaison Officer

At the end of June, the Department of Computer Science hosted the South African team taking part in the International Olympiad in Informatics (IOI). This competition is for exceptional high school students to sharpen their informatics skills—such as problem analysis, design of algorithms and data structures, programming, and testing.

Twenty-five years ago, UCT hosted the IOI for 250 participants from 63 countries. This year, in 2021, the South African team of four would have travelled to Singapore for the event, but as the Covid-19 third wave swept around the world, the 33rd IOI was run virtually in 88 countries at national venues. The Computer Science Department at UCT made special arrangements to accommodate this prestigious event despite pressure on the computer laboratories because of mid-year examinations. In addition to providing a superb venue, Virtual Machines were installed - both on PCs and, in case of load shedding, also on laptops. The technical staff gave incredible support to make this possible. The two five-hour contests were held on 22 and 25 June. Fortunately for the African and European teams competing in the IOI, the contests started from midday, while the Americas commenced before dawn and the Japanese started close to midnight.

The team of four to take part in the IOI were announced in May by the Institute of Information Technology Professionals South Africa (IITPSA). The medal winners of the SA Programming Olympiad in September 2020 attended five weekend training camps up to June 2021. The Institute has run the SA Programming Olympiad for the past 35 years and a team from South Africa has attended every IOI since 1993. This year all four team members were in Grade 12 in 2020. Taking over from Bronson Rudner (UCT 2017-2020), the team leader was Tian Cilliers of Stellenbosch University, with Taariq Mowzer (UCT Computer Science 2nd year) as deputy leader.

The 2021 results showed the South Africa team managing to hold their own internationally. Andi Qu, participating for his third time, obtained a bronze medal, placing 137th overall. For the other three contestants, this was their first IOI. They attained positions 280, 287 and 342 out of the 351 contestants. The host country, Singapore, arranged fun events in addition to the serious IOI contest days. SA team member Faran Steenkamp was placed third in the sponsored Code Cup, and won a cash prize of 200 USD.

For more than three decades, the UCT Computer Science Department has given its facilities and active support to the SA Programming Olympiad for schools and for the training of successive IOI teams. 'We are deeply grateful to UCT for this encouragement to top level informatics development' said Tony Parry, CEO of IITPSA, 'and we look forward to entering a fresh team from South Africa in the 2022 IOI - planned to be onsite in Yogyakarta, Indonesia from 7 to 14 August'.

The International Olympiad in Informatics is one of several international science Olympiads held annually around the world. Exceptional high school students from various countries compete in the prestigious algorithmic competition to sharpen their informatics skills—such as problem analysis, design of algorithms and data structures, programming, and testing.

The main aims of the event are:

- To discover, encourage, challenge, and recognise exceptional high school students for their talent in the field of informatics;·
- To foster friendly international relationships among computer scientists and informatics educators;
- To bring the discipline of informatics to the attention of young people;
- To promote the organisation of informatics competitions for high school students;

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From Student to Change Agent.

The Story of De Joe Quarcoo and the African Centre for Cities (ACC)

De Joe Quarcoo, an MPhil student in the Southern Urbanism Cohort at the African Centre for Cities (ACC) at UCT, has used his unique niche as a musical voice on urbanisation and cities, to write and produce a song called "Southern Cities". De Joe is a musician and practicing urban planner in Ghana. With a background in Social Psychology, De Joe experienced tensions with the fact that planning practice in Ghana focused mainly on hard core planning with little regard for the human factor – behavioural and cultural dynamics. This planning model has outlawed expressions of informality in Ghanaian cities. His search for answers led him to ACCs Southern Urbanism programme in the Environmental & Geographical Sciences Department (EGS) at UCT.

De Joe writes, "Our cities are our future but they elude us. Why? Safe and sustainable cities call for inclusivity. However, city managers and planners are apprehensive about incorporating informality hence the persistent marginalization of the majority of urban dwellers. Meanwhile, the geography of poverty is rapidly shifting from rural locations to 'urban peripheries'. Change comes when it is insisted upon by citizens. Citizens can only insist on change when they understand the issues. The Southern cities song breaks down the urban phenomenon to the understanding of the ordinary person. This song therefore advocates for inclusive planning and engenders an increased awareness of the urban complexities in the global South, particularly Africa's."

The Southern cities song was recorded in collaboration with the 2020 Cohort of the Southern Urbanism Programme, a very diverse group who come from Ghana, Zimbabwe, Egypt, Djibouti, South Africa, and Italy. Listen to Southern Cities on all digital channels. Watch the video here. Connect with De Joe Quarcoo on instagram @insurgentplanner. To partner the Southern Urban Sensitization Project, contact

De Joe music.dejoequarcoo@gmail.com
or QRCJOS002@myuct.ac.za

Arctic Century – celebrating 100 years of the Arctic and Antarctic Research Institute - *By Peter Ryan*

The terrestrial research team on Uyendineniya (Solitude Island) in the central Kara Sea. [Peter Ryan, third from right. Photo by Jón Björgvinsson]

In August-September 2021 I was fortunate to be able to join the Arctic Century Expedition to the Russian Arctic. The expedition, organised by the Russian Arctic and Antarctic Research Institute, GEOMAR in Germany and the Swiss Polar Institute, left from Murmansk on the ice-breaker *Akademik Tryoshnikov* to conduct research in the Kara and Laptev Seas.

For someone who has spent a fair amount of time in the Southern Ocean, it was a privilege to be able to visit the Arctic. Although there are many similarities, there are some striking differences – perhaps most notably the juxtaposition of land and ocean. The Arctic is an ocean surrounded by land, whereas the Antarctic is a continent surrounded by ocean.

Our cruise track took us across the Barents Sea, to the northern tip of Novaya Zemlya, and then across the St. Anna Trough, which is a major conduit for 'warm' Atlantic water to enter the Arctic Ocean. Its impact was apparent in the lack of ice in this area – we didn't encounter any sea-ice even when we steamed north of Frans Josef Land to 83 N. Fortunately, once we headed east towards Severnaya Zemlya we spent several days in quite thick sea-ice, and it was here that we had the most interesting wildlife, including Walrus, Bearded and Ringed Seals, and several Polar Bears. Whales, however, were surprisingly scarce, with only a few Bowhead and Minke Whales seen.

I recorded all seabirds and mammals while the ship was steaming. The diversity of birds is much lower than in the Southern Ocean, and it is strange to only see once species of petrel. However, my main task was to record the abundance and distribution of marine litter. Predictably, the Atlantic not only exports heat into the Arctic, but also large amounts of litter. What was particularly interesting, however, was the dominance of flexible packaging (bags and wrappers), which typically do not disperse far from land in warmer regions of the world. It seems that the low temperatures in the Arctic prevent the growth of sufficient epibionts to cause flexible packaging to sink.

I sampled beach litter at seven islands, including Graham Bell Island in Franz Josef Land, the three largest islands in Severnaya Zemlya, and at two small islands in the Kara Sea, Vize and Uyedineniya. This is not without its challenges, as you are not allowed to stray too far from a bear guard. Fortunately, we didn't encounter a bear on land, but we saw their tracks and every place we landed. Litter loads were highest on Vize Island, which lies just east of the St. Anna Trough, right in the path of the Atlantic water leaving the Barents Sea. The amount of litter there would not have looked out of place close to a major urban centre. Products from 19 countries were found, with most coming from Russia and Norway. The amount of litter was much greater than that reported from Svalbard, which also receives some Atlantic water through the Fram Strait.

Cliffs on October Revolution Island seen across the Red Army Strait, Severnaya Zemlya

Polar Bears make for interesting beach litter sampling. This fresh set of tracks was on Bolshevik Island in Severnaya Zemlya

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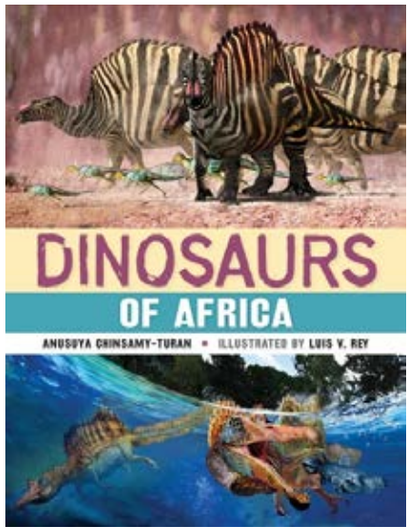

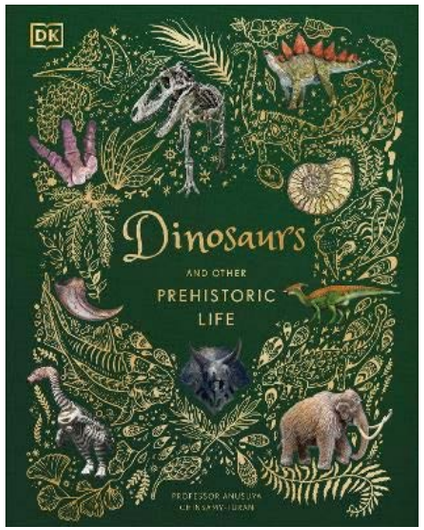

New Books IN THE FACULTY

Professor Anusuya Chinsamy-Turan
from the Department of Biological Sciences has recently published 2 new popular level books on dinosaurs.

The newest one is entitled "Dinosaurs and other prehistoric life" and is published by Dorling Kindersley (DK).

Her other book, "Dinosaurs of Africa" was released in May 2021.

In MEMORIAM

Emeritus Professor Jean Cleymans: 1944–2021
At the time of his passing **Professor Jean Cleymans** was a senior research scholar within the Department of Physics at the University of Cape Town (UCT). He was appointed to UCT as a senior lecturer in 1985, and later became professor and head of the Physics department. He also served on a number of senior UCT committees. Those who attended his courses will remember the outstanding way in which he delivered a sequence of complex ideas through mathematical formalism, but always grounding them by reference to observation and experiment.

Professor Cleymans made considerable contributions to theoretical physics with a particular focus on relativistic heavy ion collisions, most recently at the Large Hadron Collider at the European Organisation for Nuclear Research (CERN) in Geneva. His research work mainly explored the phases of quark and nuclear matter at times very soon after the Big Bang. Professor Cleymans was instrumental in establishing the SA-CERN programme over a decade ago, which continues to support South African scientists at CERN.

An NRF A-rated researcher since 1985, Professor Cleymans was the recipient of a number of awards throughout his career including the Alexander von Humboldt Research Prize in 1999. He authored and co-authored more than 300 articles on theoretical physics and supervised more than 40 master of science students and PhD candidates, many of whom are making their own significant impact in physics today.

He will be remembered by the Department of Physics and the national and international physics communities more broadly as an outstanding physicist, a dedicated supervisor and lecturer, and above all someone who loved the academy and strived to make a significant and long-lasting contribution to South African science.

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Keep Connected - Stay in Touch - Keep Connected

We value regular contact with our alumni, so please emails us on **katherine.wilson@uct.ac.za** We would like to hear about what you are doing with your Science degree in order for us to inspire a young generation of potential scientists and build career profiles of opportunities for Science graduates.

We would also like to cover interesting initiatives you are involved in, in future *Contact* newsletters.

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