November 2013 Faculty of Science University of Cape Town Vol. 2 Issue 2

Science Matters

Science Faculty Newsletter

Message from the Dean

Welcome to this 2013 end-of-year edition of "Science Matters". As usual, the year has passed with surprising speed, and we are once again in the midst of year-end processes leading up to our graduation ceremonies. This was the first year of our revised strategy to improve undergraduate throughput, and the mounting of our new Extended Degree Programme. It is too soon to tell the level of success achieved in the first year, but we hope that once results are finalized in the coming weeks, the strategy and contributions of those involved in the programme will be fully justified. For the first time, the Science Faculty has been allocated two primary graduation ceremonies, a clear reflection of our increasing graduation numbers, at both undergraduate and postgraduate level; last year's record PhD graduations will be hard to beat. Nevertheless, I hope that this trend of increased graduation numbers at all levels continues into the future.

Over the past six months, our staff and students have continued to excel in a variety of ways – in research, in teaching and in outreach activities. In the following pages some of these accomplishments are highlighted. The national NRF awards, international recognition of staff, and the truly excellent performances of some of our undergraduates and postgraduates in international competitions has been truly satisfying. The outstanding success of our students who competed in the International Mathematics Competition for University students was particularly satisfying.

The increasing pressure on funding of fundamental research was recognized by the DVC for Research and through the generosity of the VC, a really meaningful amount of research funding was made available, in competition, to researchers in the Faculty. An amazing range of research proposals were submitted for consideration, and we look forward to a special Faculty Research Day in 2015 where the results from these strategic Faculty research awards will be presented by the recipients.

Competing successfully in the international research arena remains a high priority of the Faculty and the injection of a significant level of funding towards acquisition of the strategic equipment needs of staff will hopefully go some way to facilitating further research successes. In this regard, an important event in the 2013 calendar was the International Research Review of the Faculty, held over a week in August. The resultant report has been received, and initial workshops have been held to start the process of developing a revised Faculty Research Strategy to raise our international research visibility and impact.

I wish you all a peaceful and enjoyable end-of-year break once graduation ceremonies are over.

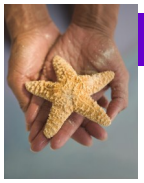
Enjoy the following pages.

Anton le Roex

UCT Researcher recognised for bringing Science to the people

The World Academy of Science (TWAS) have awarded their Regional prizes for the "Public Understanding and Popularization of Science" to five researchers from different regions of the developing world, who have worked creatively to popularize science. This year's winners are from Argentina, Bangladesh, the Philippines, South Africa and Egypt. The TWAS Sub-Saharan Africa prize was award to **Professor Anusuya Chinsamy-Turan**, HOD of the Department of Biological Sciences. Besides authoring two academic books, Anusuya has written several popular articles and a popular children's book, "Famous Dinosaurs of Africa" as well as giving numerous talks to raise awareness of Science. She also served as Chair of the advisory board of Scifest Africa, the continents biggest science festival and is a member of the advisory board of the Cape Town Science Centre. Professor Berhanu Abegaz, executive director of the African Academy of Science, which hosts TWAS, who made the award, said, '...the award is proof that the region could produce world class scientists in all fields of science and is an inspiration to young scientists in Africa"

Anusuya Chinsamy-Turan receives her certificate



Our Science Stars:

John Woodland, from the Department of Chemistry just keeps on dazzling:

SA's first Science Slam took place at the Sci-Bono Discovery Centre in Johannesburg in October. The brief was to 'make a lay audience understand and get excited about the scientific research topic you are passionate about" John was placed second at the event.

John also presented his research on accelerating the development of more effective and more efficient antimalarial agents, at the Falling Walls "Lab" in Johannesburg. Participants are given only 3 minutes to present their research! He said that it was a wonderful opportunity to meet with and present his work to other research students in disciplines as varied as politics, engineering and education. He was placed first in the country and as a result was invited to participate in the international Falling Walls Lab in Berlin in November. At that event, John won third place in the "Young Innovator of the Year" competition. One of the prizes was an opportunity to deliver his talk at the Falling Walls conference the following day. The latter conference is billed as "The international conference on future breakthroughs in Science and Society" and is attended by Nobel laureates, the Director-General of CERN, the UK Government Chief Scientific Advisor, etc. He presented at the same session as Professor Jill Farrant from the Department of Molecular and Cell Biology.

After all that travelling, John says he is happy to be back in the lab and that is where he can be found—other than when he is rehearsing for the upcoming production of "Harry Potter and the Molecule of Doom" - the annual Jack Elsworth lecture/play.

Winners: Tilsetso Lephoto, John Woodland & Alessandro Craparo

Dr Hilkka Njaula a Ma-Re post doctoral student in the Department of Biological Sciences and founder and director of Dried Fish Company (DFC), and in partnership with the Women's Enterprise Development Initiative (WEDI), won the 2013 SEED (Supporting Entrepreneurs for Sustainable Development) Award. The SEED Initiative supports entrepreneurial and innovative ideas that are locally-driven and have great potential to contribute to sustainable development.

The DFC promotes food security and rural development in Namibia and this budding company ousted 500 other applicants from 85 other countries to walk away with the coveted prize. DFC is working in partnership with a local community initiative (WEDI), that empowers women entrepreneurs by selling solar-dried fish products to the women of WEDI, who in turn sell the fish products in their local communities. DFC is therefore pro-actively managing food security using renewable energy and developing women in the business sector in Namibia!

Hilkka recently accepted the award at a prize-giving event hosted at the United Nations Office in Nairobi, Kenya.

Hilkka Njaula alongside the Dried Fish/ Food Company Banner at the award ceremony in Nairobi, Kenya where

UCT students excel at International Mathematics competition

A brilliant UCT maths team, flew the UCT flag high in Bulgaria and came 18th out of 72 participating universities, at an international mathematics competition. The university's ranking at 18th saw it ahead of Yale (25th) and Cambridge (32nd). The team representing UCT in Blagoevgrad, a city in south western Bulgaria, consisted of **Liam Baker**, a maths honours student, first-years **Robert Spencer** and **Dylan Nelson**, and **Sean Wentzel** a second-year student. The four team members are no strangers to international competitions - as school boys they represented South Africa at the International Mathematics Olympiads on more than one occasion.

Dr Henri Laurie of the Department of Mathematics and Applied Mathematics led the team. Laurie, like team leaders from other universities, also marked the papers in the competition. Wentzel and Baker were awarded first prizes and given gold medals after being ranked overall 30th and 33rd, respectively. Spencer got an honourable mention in the competition, which took place over two days, and in which 321 students from 72 universities participated.

NSTF-BHP BILLITON AWARDS 2013

Professor Graeme Cumming , from the Department of Biological Sciences won the T W Kambule NRF Awards: To an Individual for an Outstanding Contribution to SETI through Research and its Outputs over the last 5 to 10 years.

Professor Cummings was also awarded the Southern African Association for the Advancement of Science (S2A3) British Association Medal (Silver) for 2013. This award is made annually to a person under the age of 40 who is actively engaged in scientific research and who has proved evidence by way of publications, discoveries and/or skills of outstanding capability and achievement, especially when measured by international standards.

Trevor Manuel, Prof Graeme Cumming & Dr Thandi Mgwebi, NRF

NRF Honours UCT Champion of Transformation in Science

Associate Professor Maano Ramutsindela, from the Department of Environmental and Geographical Science, was awarded the prestigious NRF Special Category Award for Transformation of the Science Cohort for his efforts to transform science in South Africa, by grooming the next generation of black scientists.

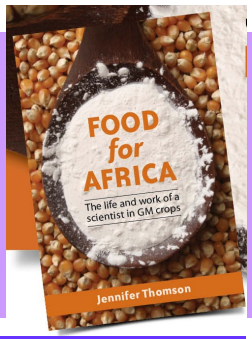
The award recognizes Associate Professor Ramutsindela's contribution to the transformation of science by attracting more black scientists to academia and helping them become leaders in their respective fields. He explained, "The challenge is that the world of academia is never clear or simple, particularly for people who are suddenly expected to imagine a world they have never been exposed to. Through spending time with potential students before they register, I look for ways to help them prepare—intellectually and psychologically—for the road ahead."

Associate Professor Jenny Day, from the Department of Biological Sciences, has been awarded the South African Society of Aquatic Scientists Gold medal. This is awarded on rare occasions in recognition of an exceptionally high standard of research in the aquatic sciences, or for an exceptionally valuable contribution to the management, conservation or development of aquatic ecosystems or resources, over an extended period. Congratulations Jenny!

Dr Amanda Weltman, from the Department of Mathematics and Applied Mathematics, was awarded the Jubilee Silver medal from the South African Institute of Physics.

Professor Kelly Chibale, from the Department of Chemistry has been awarded the MRC Young Scientist Award (Silver Medal) in recognition of excellent research in the area of Drug Discovery.

Emeritus Professor Jennifer Thomson, from the Department of Molecular and Cell Biology, has just published her third book, "Food for Africa: The Life and Work of a Scientist in GM Crops". The book traces her career through the development of this research, from being a student in a laboratory at Harvard University, where she bucked the trend and used genetic engineering, which she pioneered, up to current times, when 80% of maize grown in Africa is genetically modified—for insect and herbicide resistance.



Professor Mino Caira, from the Department of Chemistry, presented a lecture at the 1st Latin American Meeting on Crystallography at the National University of Cordoba and was awarded honorary membership of the Society. The award was made in recognition of his contributions to supramolecular beneficiation of organic compounds.

Dr A Penenory (Cordoba Secretary, Organizing Committee), Prof Caira, Dr A Pierini (President of SAIQO) and Dr S Pellegrinet (Rosario Secretary, Organizing Committee

Dr Andrew Hamilton, from the Department of Physics is the recipient of the College of Fellows Young Researcher Award, for his lecturing and research in high energy particle physics, working in the ATLAS Collaboration at the European Centre for Nuclear Research in Geneva .

Dr Hamilton is seen here with Dr Max Price, Prof Danie Visserand other recipients at the awards dinner.

Record 8 PhD's to graduate from Computer Science

The Computer Science Department will graduate a record eight PhD students this year. This is an exceptional accomplishment, as it took several decades from the department's inception to graduate its first 8 PhD students. Give the lack of Science PhD's in the country, and in Computer Science in particular, this phenomenal increase in Computer Science PhD graduates from UCT is a singular achievement.

One key theme running through most of the work these students produced is the application of digital technology to the challenges and needs of Africa.

Ilda Ladeira collaborated with the District Six museum to create a virtual museum in which 'visitors' could listen to and ask questions of virtual guides, who recounted the stories of the real guides in the actual Museum. Originally from South Africa, Ilda has now moved to Seattle and taken a job with Microsoft.

Originally from Thailand, **Jakkapan Tangkuampien** wanted to see if he could use mobile technology to address the teaching needs of South African schools. Based around MXiT technology, he created a system that links students to a math tutoring system and to their human teachers. By blending education with a technology the students enjoyed using, he created an educational system that learners wanted to use. So inspired was he by the educational impact he could have that he is now employed as a full time high school teacher.

Olutayo Boyinbode from Nigeria also looked at making academic materials more available on mobile devices. She created a technology that reconfigures recorded lectures into different formats optimized for different computing devices. She has now returned to a lecturing post in Nigeria.

Mohammed Mustafa Ali is interested in making it possible for people of his home country - Sudan - to find high quality information using search engines like Google. Mohammed's PhD showed that better quality search results can be produced by algorithms that acknowledge multilingual searchers. He has returned to Sudan University of Science and Technology, where he continues to work on such problems.
researcher on the Square Kilometer Array radio telescope.

Among the graduates are several African students who are supported by a Hasso Plattner Institute PhD bursary scheme. The first is **Shikoh Gitau** from Kenya, who created a mobile job-finding system that matched the unemployed with job opportunities. This system now has over 100 thousand users in South Africa and Shikoh has gone on to be the User Experience head for Google in Africa.

Christopher Chepken, also from Kenya, researched the needs of casual labourers and the NGOs that support them. He developed a system that was used in South Africa, Namibia and Kenya to help casual labourers find employment. He has now returned to Kenya where he is lecturing in the University of Nairobi.

Raymond Mugwanya from Uganda was interested in how to make university education more accessible using technology. He researched and built a system that is able to record lectures in a digital format optimized for viewing on mobile devices. In this way, students who miss lectures can catch up later on their mobiles. He has returned to Uganda to lecture in Makerere University.

Other PhD's are contributing to Africa but with a stronger focus on pure science. **Simon Perkins** is a South African who returned to UCT from industry in order to pursue a PhD in Geometric Pathfinding. He is now using his High-Performance Computing Skills as a post-doctoral fellow.

More Graduation Stories…….

Odette Curtis will be graduating this December with a PhD in Biological Sciences. Odette attained an MSc through the Fitz at UCT after working as a volunteer on bird projects. She started up and is now director of The Overberg Lowlands Conservation Trust - an NGO conserving renosterveld, based in the Overberg. Odette started research into a better understanding of how to manage this very endangered ecosystem, and was persuaded to turn her work into a PhD, which she succeeded in doing, despite her many commitments to active conservation.

Odette lives in Napier and has a wide range of interests and energy, enthusiasm and drive. Together with Dr Muthama Muasya and Charles Stirton (ex Kew Gardens), Odette has discovered at least three new plant species in renosterveld, two of which will be named after her.

Thobela Bixa will be graduating with an MSc in Chemistry, with distinction, under the supervision of Professor Roger Hunger. Thobela comes from Khayelistha and has been actively involved in his community where he serves on the Board of directors of IkamvaYouth: an NGO that helps high school learners to access post-matric opportunities. He spent seven months at the University of Michigan on a prestigious scholarship and was featured in the Mail and Guardian's Top 200 young Influential South Africans in their education categories.

Eli Kasai will be graduating with an MSc in Cosmology and will be one of the first ever Namibian astronomers. He was born in the north eastern part of Namibia, along the banks of the Kavango river, which forms the border between Angola and Namibia. He completed a BSc in Mathematics and Physics in 2004 at the University of Namibia (UNAM) and took up employment in NamPower as a graduate Energy Trader in 2005 and later on as Commercial/Operations Analyst. In 2010, he enrolled for the Honours National Astrophysics and Space Science Programme (NASSP), at the University of Cape Town, and then went on to complete his Masters degree. He is currently working on his PhD with Bruce Bassett.

What inspired him to study science?

Eli says, "Initially, I was nuts about becoming a medical doctor. Then one day in high school, during a study session in the library with classmates, I stared for a very long time at the globe that was sitting on the table in front of us and wondered about the nature of the earth, the day and night effect and it's orbital speed of about 30 km/s was unimaginable and beyond comprehension, especially when I thought of a car travelling at such a speed. That was it; my mind became more curious and I was transformed from becoming a hardcore medical doctor, to following a career in astrophysics and registered for an undergraduate programme that would enable me to do so later on in life. I have also been inspired along the way by the Dstv History channel documentaries on the universe."

MCB Postgraduate Research Day

At the Department of Molecular and Cell Biology's annual postgraduate research day, they showcase a wide variety of research carried out in the department, had plenary talks by postdoctoral fellows, Dr Maya Pfaff and Dr Nicki Adams as well as oral and poster presentations and FameLab talks by postgraduates. The FameLab talks were a new addition to the programme, whereby students delivered 5 minute talks about their research, using only props they could carry with them. First prize was awarded to PhD student Caroline Beltran and Honours student Tarryn-May for oral and poster presentations, respectively, while MSc student Jonathan Glass won first place for his entertaining FameLab talk. Jestin George won first prize in the annual MCB Writing Competition, in the Developing Writer category and PhD student Alexis Bick won the Popular Article category.

MCB Honours student Jestin George receiving her certificate from Lisa Warburg (Inqaba Biotec) for winning the Developing Writer category of the MCB Writing Competition

PhD student Caroline Beltran won first prize for her oral presentation, where she discussed her work on the proteomic analysis of the abalone immune system.

SCRU Celebrates the 2013 Nobel Prize in Chemistry …Taking chemistry into cyberspace

By Professor Kevin Naidoo, SCRU, Dept of Chemistry

Studying computational chemistry was not considered "real science" in South African chemistry circles in the 1980's. Is it real? "Your calculations cannot be tested with an experiment and so they are wrong!" was often the kind of comment that would follow a seminar describing results from a "computer experiment". Thank goodness those dark days are over and the future looks bright for the many computational chemists and biologists the world over celebrating their field that is now a necessary part of the scientific method.

This was made possible by Martin Karplus and Arieh Warshel who laid down the theoretical framework proving that the results of hybrid quantum-classical (QM/MM) computations were valid. A few years later Arieh Warshel and Michael Levitt showed that it was possible to perform such a calculation on a small enzyme but it was only in 1991 that Dr Martin Field introduced refined computer algorithms that included electron dynamics using reliable quantum computations. Computer experiments of chemical reactions were within reach!

You must forgive us here at the Scientific Computing Research Unit (SCRU) for our enthusiastic celebrations. It is only because this Nobel prize more than any other underscores the importance of the research being conducted in our laboratories. Every graduate student and postdoctoral fellow, whether they are working on enzyme reaction dynamics critical to cancer research, or collaborating with the discoverers of the QM/MM method to develop new accurate accelerated algorithms, were given a major confidence boost.

As one student exclaimed "it is wonderful to know that we're working at the forefront of international science." I agree. – Kevin J. Naidoo

...in the SCRU server room….with T's to celebrate……
Back row: Monde Sinxi, Werner Crous, Yevgeny Moskovitz
Middle Row: Professor Kevin J Naidoo, Dr Gerhard Venter, Dr Christopher Barnett
Front left: Alicia Rension Louise Bezuidenhout, Sabena Shaik Yusuf
Front right: Kyle Fernandes, Krishna Govender
Front: Ian Rogers

Celebratory lunch at Forries: to the left: Vela Mngadi, Sabena Shaik Yusuf, Ian Rogers, Professor Kevin J Naidoo, Kyle Fernandes
to the right: Werner Crous, Monde Sinxi, Dr Yevgeny Moskovitz, Dr Chris Barnett, Dr Gerhard Venter

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Computer Science hosts all-new Open Evening

Thanks to a collaboration with the UCT Careers Office, this year's **Computer Science Department's** new-look Open Evening in Jameson Hall was met with great acclaim by guests from Industry and academia.

The ever-increasing numbers who view Honours, MSc and PhD work in Computer Science led to moving this event from the Department to Jameson Hall - where many of these Computer Science students will shortly be graduating, including 4 PhDs, several MSc's and 48 Honours students.

Deon van Biljon of Stanchion Payment Solutions awards the Best Poster Prize to Matthew Laten and Chris Goosen at the Computer Science Open Evening.

Also new at this year's Open Evening was the award of a Best Poster Prize by Stanchion Payment Solutions, won by **Chris Goosen** and **Matthew Laten** for their GPU Accelerated Terrain Engine poster. Projects on view ranged from studies comparing gestural vs button-press mobile interaction on the one hand, to scalable systems for efficient compression of KAT-7 telescope data at 5Gper second to artificial neural network studies to support anthropological research, amongst many others.

Conferences and Talks by visiting lecturers…

Hard Probes Conference by Will Horowitz, Department of Physics

Delegates of the Hard Probes conference at Solms Delta Wine Estate

What happens at a trillion degrees? What was the universe like a microsecond after the Big Bang? Answering these questions is one of the goals of the field of high-energy nuclear physics. From Nov 4 - 8, 2013 UCT hosted over 190 high-energy nuclear physicists from 24 countries in Stellenbosch for the "6th International Conference on Hard and Electromagnetic Probes of High-Energy Nuclear Collisions." Prior to the conference, UCT organized a summer school for the young researchers in the community. More than 50 students—coming from Venda, UCT to MIT and everywhere in between—spent five days at the University of Cape Town receiving instruction from world-leading researchers from France, Finland, the United States, and South Africa. The conference itself had an auspicious start with an opening address from Mr. Michael Masutha, the Deputy Minister of the Department of Science and Technology.

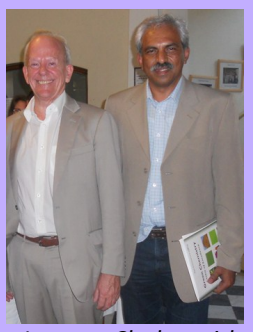
Hosting the conference was a proud moment for UCT. The international community chose South Africa as the location for the conference over strong competing proposals from Canada and China. UCT was selected in support of our budding high-energy physics community, which is simultaneously young and growing and also a major contributor to the field. The conference itself was a tremendous scientific success as participants got the very first look at data from the last run of the LHC before its multi-year shutdown for upgrades. These newest and last data were initially thought to come from a "simple" control experiment. But the results were incredibly surprising, with the observation of numerous nontrivial-and as yet not understood-effects. Clearly many of our preconceived notions about Nature are incorrect, and the data shown at the meeting will drive the field for years to come. In the words of Professor Will Brooks of USM Valparaíso, Hard Probes 2013 was "obviously a momentous occasion on the unveiling of the first p+Pb results, which will be imprinted on the memories of the attendees, forever associated with this beautiful spot."

Green Chemistry

The Department of Chemistry was visited by one of the leading experts in green chemistry, **Professor James Clark**.

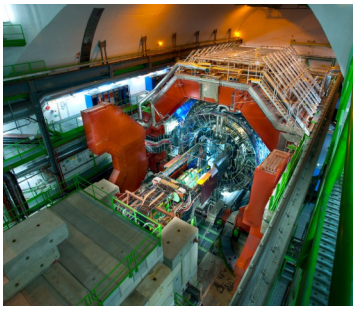
Green chemistry has been receiving a lot of interest lately with the focus being on creating a sustainable environment. His open public lecture 'Waste as a Future Feedstock' was held at the Two Oceans Aquarium and gave the public a glimpse of what green chemistry is and why is it so important. He also gave a talk entitled 'From Waste to Wealth using Green Chemistry' to chemistry students at UCT, highlighting the pros and cons of the current chemical industry.

In order to help South Africa get into the loop on green chemistry, Clark gave a workshop to academics where he highlighted the role of green chemistry education. Clark was hosted by **Dr Anwar Jardine** from the Department of Chemistry, who was recently awarded an AKTP grant which centres around a water treatment project based in the Garies municipality.



Professor James Clark with Dr Anwar Jardine

ALICE and UCT strengthen ties



The ALICE detector

A visit by CERN officials highlighted the contribution of UCT scientists to the ALICE (dedicated heavy ion physics) experiment at the Large Hadron Collider and to the investigation of the QGP, or quark-gluon plasma.

Professor Paolo Giubellino, spokesperson of the ALICE Collaboration, visited UCT to meet Professors Danie Visser and Anton le Roex, to strengthen the ties between ALICE and UCT and discuss future opportunities for collaboration. He commended the commitment of UCT to the fundamental research conducted by the ALICE experiment, which is underlined by the recent appointment of Dr. Thomas Dietel in the Department of Physics, who continues the work of Professor Jean Cleymans, the previous leader of the South African ALICE group. Dr Happy Sithole (Centre for High –Performance Computing) emphasised the strategic importance of the cooperation between ALICE and CERN to prepare for the challenges in high performance computing that SA will face when hosting the Square-Kilometer Array.

STAFF NEWS

WELCOME TO NEW STAFF

Geological Sciences:
- Denise Lesch—Senior Secretary

Physics:
- Dr Thomas Dietel—lecturer in Department
- Mr Gregor Leigh—Senior Lecturer

Mathematics & Applied Mathematics:
- Dr Jonathan Shock—Lecturer
- Dr Charalampos (Harry) Skokos—Senior Lecturer

Biological Sciences:
- Gugulethu Ginindza—Departmental Assistant

Chemistry:
- Monique Muller—Chemical Safety Officer for the Science Faculty

Statistical Sciences
- Ushma Galal—Principal Scientific Officer

Science Faculty Office
- Aisha Hassan—Senior Finance Officer

FAREWELL TO STAFF:

The following staff are retiring after many years of serving the Faculty of Science with distinction:

- David Aschman—Physics
- William Bond—Biological Sciences
- Jacobus Claasen—Biological Sciences
- Tim Crowe—Biological Sciences
- Tim Dunne– Statistical Sciences
- Charles Griffiths—Biological Sciences
- Dave Reid—Geological Sciences
- Jeronimo Rodrigues—Molecular & Cell Biology
- Frank Shillington—Oceangraphy
- Sandy Smuts - Biological Sciences

and the following staff are also leaving:

- Dr David Braun—Archaeology
- Thi Hong Hanh Le—Computer Science
- Dr Douglas Harebottle—ADU
- Donella Young—ADU

CONGRATULATIONS

Congratulations to **Dr Johann Diener** from the Department of Geological Sciences who recent got married to Leida, a psychologist.

He even wore shoes and a suit for the event!

DOYEN OF PERCY FITZPATRICK RETIRES AFTER 40 YEARS

Professor **Tim Crowe** retires on 31 December 2013 after 40 years at the FitzPatrcik Institute, UCT.

Born in Boston, Massachusetts, USA, Tim graduated with a BA biology from the University of Massachusetts, Boston in 1970 and with an MSc for his research on the taxonomy of Helmeted Guineafowl, *Numida meleagris,* from the University of Chicago, in 1972. Tim joined the FitzPatrick Institute, UCT in 1973 as a PhD student. At the Rooipoort nature reserve near Kimberley, he researched the demography, ecology, parasitology, ecophysiology and sustainable hunting of Helmeted Guineafowl for his PhD which he received in 1978. Tim's career at the Fitztitute focused on the evolution of gamebirds and gamebird management. He was appointed as a junior lecturer in 1976, promoted to lecturer in 1978 and to senior lecturer in 1979. During 1981-1982, he visited the American Museum of Natural History, New York, where he interacted with top systematists who introduced him to phylogenetics and biogeography which took center stage in his research during the 1980s. In 2003, Tim was promoted to full Professor; and was elected a Fellow of UCT in 2007.

Tim has supervised 33 MSc and 15 PhD students, published over 240 papers in peer-reviewed journals, and presented scientific papers at 82 conferences.

MCB Mini Soccer Tournament

Academics, postgraduates and postdoctoral fellows from the Department of Molecular & Cell Biology displayed their skills outside the laboratory in their highly anticipated annual 5-a-side soccer tournament in August-September. Mixed gender teams, each with a representative academic and named after the bloodthirsty houses from the *Game of Thrones* books, battled it out for glory on the UCT indoor soccer field. The event was won by the black team, "Baratheans", with the highest number of goals scored by MCB Honours student Philippe Koch. Thanks to the tournament sponsors, Inqaba Biotec, and their representative Lisa Warburg, who even participated in the soccer.

PROMOTIONS IN THE FACULTY

Promotion from Lecturer to Senior lecturer

- Dr Suhail Rafudeen (Molecular and Cell Biology)
- Dr Babatunde Abiodun (Environmental and Geographical Sciences)
- Dr Adam West (Biological Sciences)
- Dr Ake Fagereng (Geological Sciences)
- Dr Johann Diener (Geological Sciences)
- Dr Andrew Hamilton (Physics)
- Dr Neill Robertson (Mathematics and Applied Mathematics) - Academic Teacher

Promotion from Senior lecturer to Associate Professor

- Dr Greg Smith (Chemistry)
- Dr Simon Hall (Archaeology)
- Dr Muthama Muasya (Biological Sciences)
- Dr Peter Bruyns (Mathematics and Applied Mathematics)
- Dr Patrick Marais (Computer Science)

Promotion of Principal Research Officer to use title of Associate Professor

- Dr Mathieu Rouault (Oceanography)

Promotion from Associate Professor to Professor

- Associate Professor Andy Buffler (Physics)
- Associate Professor Justin O'Riain (Biological Sciences)

Promotion from:

Technical Officer to Senior Technical Officer

- Mr Desmond Barnes (Biological Sciences)

Scientific Officer to Senior Scientific Officer

- Ms Shakiera Sattar (Molecular and Cell Biology)

Chief Scientific Officer to Principal Scientific Officer

- Dr Cornelia Klak (Biological Sciences)

Faculty Admin Staff fresh faces….

Members of the Science Faculty administrative staff came together in festive mood for a year-end gathering in the Biological Sciences museum on 14 November 2013.

Some attendees put a new spin on the event, with fresh faces, and might need to take care not to be mistaken for a new kind of museum specimen.

Biological Science Conference—

Free Public Talks: 2 to 7 December 2013

The newly formed **Department of Biological Sciences** at the University of Cape Town will be hosting a four day conference on biodiversity research in the region, from 2-7 December 2013. Several leaders in the field of biodiversity research have been invited as keynote speakers . You are invited to the following Public Talks :

Dr Steven Goodman , a MacArthur Field Biologist of the Field Museum of Natural History in Chicago, USA will give a talk entitled **Madagascar's Biodiversity: Origins, Patterns and Future"** on Tuesday 3rd December, 17H30 – 18H30, LT1, John Day Building, Upper Campus, UCT.

Associate Professor Marcus Byrne of the University of the Witwatersrand will be presenting a talk entitled: " **Jika ne Langa – Turn with the Sun –Like a Dung Beetle"** on Thursday 5th December, 17H30 – 18H30, LT1, John Day Building, Upper Campus, UCT.

To attend rsvp to **: Sarojini.pillay@uct.ac.za**

Research Bytes.....

Mysterious 'Fairy Circles' in African Desert Get New Explanation

Tracks of Oryx antelopes crossing fairy circles in an interdune pan in Namibia

Fairy circles are circular patches of perennial grasses with a barren center that emerge in the deserts along the southwest coast of Africa. The bizarre circular patches of bare land called "fairy circles" in the grasslands of Africa's Namib Desert have defied explanation, with hypotheses ranging from ants to termites to grass-killing gas that seeps out of the soil. New research suggests that the patches may be the natural result of the subsurface competition for resources among plants .

Grasslands in the Namib Desert start off homogenous, but sparse rainfall and nutrient-poor soil spark intense competition between the grasses, according to the new theory. Strong grasses sap all of the water and nutrients from the soil, causing their weaker neighbors to die and a barren gap to form in the landscape. The vegetation gap expands as the competition ensues, and the grass-free zone becomes a reservoir for nutrients and water. With the additional resources, larger grass species are then able to take root at the periphery of the gap, and a stable fairy circle develops.

Michael Cramer, from the Biological Sciences department is the lead researcher of the current study, published recently in the journal PLOS ONE, also thinks the termite theory falls short. "I think the major hurdle that explanations have to overcome is explaining the regular spacing of the circles, their approximate circularity and their size," Cramer told LiveScience. "There's no real reason why termites would produce such large circles that are so evenly spaced."

Scientists have previously proposed that fairy circles are an example of a "self-organizing vegetation pattern," which arises from plant interactions. In 2008, researchers developed a mathematical model showing the vegetation patterning of fairy circles could depend on water availability. To test this theory, Cramer and his colleague Nichole Barger from the University of Colorado at Boulder first measured the size, density and landscape occupancy of fairy circle sites across Namibia, using both Google Earth and ground surveys. They then collected soil samples at various depths from inside and outside the circles, and analyzed them for water and nutrient content. Finally, they plugged the information, along with climate data such as seasonal precipitation and temperatures, into their computer models. "We found that the size of the circle, the density and degree to which they occupy the landscape are all associated with the amount of resources available," Cramer said. Specifically, fairy circles are smaller if they have more resources, such as soil nitrogen and rainfall. This makes sense, Cramer explained, because the taller grasses won't need a large reservoir of resources to get started and survive if water and nutrients are already available in the environment. On the other hand, the grasses require a large reservoir to sustain themselves if the soil is poor in water and nutrients.

The researchers discovered that rainfall strongly determines the distribution of the fairy circles across Namibia, with circles only appearing in areas where there is just the right amount of rain (not too little, but not too much). If there's too much rain, the bountiful resources would "relax" the competition for resources and the circles would close up; but if there's too little rain, the competition would become too severe and the circles would again disappear, Cramer said. Because the circles can only occur in this narrow moisture range, differences in rainfall from year to year may cause them to suddenly disappear and reappear in an area over time. With this information, they found that they could predict the distribution of the fairy circles with 95 percent accuracy. Additionally, the regular spacing between fairy circles may be the result of inter-circle competition, with grasses from each circle "battling" with other circle grasses for resources, Cramer said. Cramer notes that termites may still be involved in fairy circles. "What sets up the circles is the competition between plants," he said. "Termites are a secondary phenomenon, and their role is to serve as a maintenance for the circles by killing off the grasses that spring up in the center of the circles."

Evidence of Oldest Stone-Tipped Throwing Spears in the World, discovered in Ethiopia

An international team of researchers working in the Ethiopian Rift Valley has just published new results of studies on 280 000-year-old pointed stone artifacts which are shown to have been used as the tips of throwing spears. The first author on the paper, in the journal PLOS ONE, is **Yonatan Sahle Chemere**, a PhD student from the Department of Archaeology at UCT, who conducted the study as part of his doctoral dissertation resesarch. Co-authors on the paper are **Dr David Braun** and **Professor Judith Sealy** from the Department of Archaeology at UCT.

The conclusion that hominids in Africa threw stone-tipped spears at their targets in deep antiquity was drawn from analysis of speak points made on volcanic glass called obsidian at the Ethiopian Stone Age site known as Gademotta. The analysis combined a traditional assessment of overall spear point shapes and breakage patterns alongside newer microscopic methods able to establish that the obsidian points had been broken by high velocity impacts.

Throwing spears provided their makers the advantage of wounding/ killing at a distance. Therefore, they reduced dangerous confrontations, and possibly fatal scenarios, during hunting and combat. In addition, making stone-tipped throwing spears requires attachment of the stone tip to the spear's shaft. Bringing different components together in a single tool is considered by archaeologists to be evidence of sophisticated technological behaviour.

The present discovery provides crucial evidence that hominids actually threw stone-tipped spears at their targets tens of thousands of years before the emergence of our species *Homo sapiens* in eastern Africa. Fossils of the world's earliest *Homo sapiens* are known from nearby sites in Ethiopia that are 85 000 years younger than the spear points.

Evidence for early hunting with hafted spear points was recently reported at a site in South Africa called Kathu Pan. However, inferences are that these South African spears had been thrust into prey, not thrown from a distance. The Gademotta finds provide the earliest conclusive evidence for hafted, hand-thrown spears.

Certain views about the emergence of what are known as "complex behaviours" hold that this was a relatively swift advance that took place over 100 000 years after the earliest *Homo sapiens* had appeared in Africa. The results of this study indicate that the earliest members of our species and their immediate predecessors already possessed some behaviours considered to be "complex". As a result, our understanding of the lines of evidence that are considered to be markers of *becoming human*, will need adjustment.

Throwing Spear discovered

Dr David Braun and Yonatan Sahle at the Excavation site

The **Biopharming Research Unit** - affectionately known to its members as 'The Bru' - was accredited by the SEC in September 2013. The new Unit is based in the Department of Molecular and Cell Biology, and comprises the research groups led by **Professor Ed Rybicki,** who is the Director. The BRU has as its central mission the expression of pharmaceutically relevant recombinant proteins in plants and insect cells, and a side mission in engineering virus resistance in maize and other crops. Members of the Unit are inventors on possibly the largest portfolio of patents at UCT, and the largest molecular biotechnology portfolio in South Africa. Principal projects right now are the production of pandemic and potentially pandemic influenza vaccines, candidate vaccines against bluetongue virus in ruminants, and chimaeric papillomavirus vaccines."

"Experiencing CERN by Claire Antel of the Department of Physics

Claire Antel from the Department of Physics went on an exchange to CERN. Here she tells of her experience:

Chilufya Mwewe & Claire Antel in front of ATLAS

"Being at CERN is intriguing in the way that you meet the whole world but not one local. A simple form of English is mainly spoken, with a myriad of accents. CERN is a clean and high-tech place, as is expected from one of the world's largest research centres: auditoriums with microphones for every seat, countless meeting rooms with projectors and more microphones, larger-than-yourself Nespresso machines and the iconic Globe Of Science, inside which an interactive projection of the collider and its detectors glows on a round table and one can sit in space pods while an electronic voice whispers about science in your ear.

The CERN site also has its "slums" however: workshops with abandoned detectors, rogue sheep and a forlorn-looking sanctuary (rabbit hatch) for retired/abandoned (computer) mice. There is an underground network of tunnels (not the actual beam tunnel!) that connects all buildings on site and is great fun to explore, as it holds many surprising items left there by former adventurers.

I had the good fortune of being accepted to the CERN summer school 2013, costs of which were entirely covered by CERN. The summer school was an 8 week-long school of lectures and work on a summer project with an assigned supervisor from CERN. My supervisor was Dr Heather Gray, a former UCT and CERN summer student herself. During the summer school I worked on developing algorithms for the reconstruction of particles that are detected in the ATLAS calorimeter. The school was a tough period, as you have to manage your time well. You constantly have to work on your project, concentrate in lectures (which were on a broad range of topics well-worth listening too), and additionally keep up with your social life and organise weekend adventures around Europe together with your summer school pals.

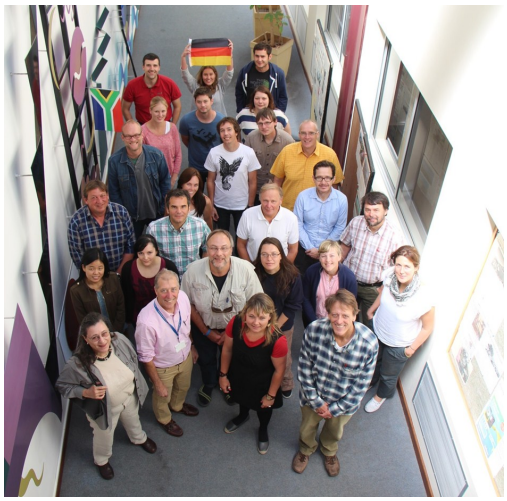
After the summer school I stayed on with my fellow UCT student, Chilufya Mwewa, for a further 3 months. During this time I continued on my Masters research with Dr Gray. My Master's research involves the analysis of the single top quark production in association with a Higgs boson in order to investigate the top Yukawa coupling (interaction between the Higgs and the quark).

There are innumerable activities at CERN and in and around Geneva, and CERN has a kayak-canoe club, cinema club, football and rugby club, or one could get sweaty dancing salsa in a club in Geneva, hiking in the mountains embracing the town or wine tasting in the vineyards spilling over the hills just behind CERN. We very often organised dinner parties at which one of us proudly presented some typical dish from our home country, where cheap yet good French wine would flow.

To be truthful, working at CERN felt like a 9-5 job, during which I sat in front of the laptop screen all day, impatiently waiting for my code to finish running or dealing with illogical errors in ROOT (the programming framework used at CERN to analyse large datasets) or analysing histograms all day that ever so slightly change with every modified code run. But then moments like these happened: watching the Nobel Prize in Physics announcement to François Englert and Peter W. Higgs in a crowd of chuffed CMS and ATLAS researchers, or attending a talk by George Zweig himself or, ah, seeing the three great structures of the ring, glinty and colourful: the ATLAS, CMS and ALICE detectors. Moments like those reminded me of the great quest, the unveiling of the mechanisms of the universe, that I got to be a small part of. I hugely appreciated receiving the opportunity to work at such a world-renowned and respected research centre, where I regularly passed by famous scientists at lunch such as John Ellis and Fabiola Gianotti. Over and over again, I found that I got butterflies in my tummy for physics.

PS The 2013 Nobel prize physics went to Higgs and Englert for their theoretical work that was recently confirmed by ATLAS and CMS .

Full steam ahead for 'RAIN': first field sampling expedition and workshop now completed by Mike Meadows



Researchers (see photograph, right) from a number of universities, convened at UCT in November, to consider recent progress on a major collaborative project, funded by the BMBF, aimed at understanding the longer term climate and environmental dynamics around the southern African coastline. Participants were from the Universities Bremen and Jena in Germany, Cape Town, KwaZulu Natal and Witwatersrand. Lead scientists include Dr Matthias Zabel (University of Bremen), Professor Roland Mäusbacher and Dr Torsten Haberzettl (Friederich Schiller University of Jena) and Professors Mike Meadows and John Compton from UCT.

The RAIN (Regional Archives for Integrated iNvestigations) project, with funding of around Euro 1.7m over three years, is aimed at revealing details about how climate and associated environmental conditions have changed during the late Quaternary, a period spanning the last glacial-interglacial cycle and one which has witnessed major shifts in climate, sea level and human activity.

RAIN is focused on both terrestrial and marine sediments, micropalaeontology and organic biomarkers, and includes a strong focus on capacity building in both southern Africa and Germany. The research involves sampling terrestrial and marine sedimentary records at three major localities around the southern African coastline; representing the summer, winter and all-year rainfall regions of the country, and applying a wide range of physical, chemical and biological analyses in order to reveal details about the longer-term dynamics of climate and associated environments in this important region.

The first phase of terrestrial sediment sampling was recently completed in the Wilderness region of the southern Cape. The initial results are extremely promising; the team was able to obtain a 30.5m core (a record for the equipment used) from Eilandvlei and, together with other material from Swartvlei, Langvlei, Groenvlei and Vankervelsvlei, more than 75m of sediments are now back in the Department of Physical Geography laboratory in Jena awaiting sub-sampling and analyses. Core bottom material has been dispatched for radiocarbon dating to provide the scientists with an approximation of the age of the deposits before further sampling is conducted. Postdoctoral scientists from the Department of Environmental & Geographical Science at UCT will travel to Jena in January to sub-sample the cores for pollen and diatom analyses, while a wide range of organic and inorganic sediment analyses will be carried out in Germany.

The first marine sediment sampling leg along the West Coast will be conducted in December 2014 by German and South African scientists aboard the German research vessel *RV Meteor*.

UCT's Astronomy department organised an **SKA-related workshop** in July 2013 on "Radio Transients with SKA Pathfinders and Precursors" with a particular focus on the exploration of discovery space enabled by novel computational techniques and more sensitive telescopes. 57 participants (postgraduate students, postdoctoral fellows and staff) from 7 countries (South Africa, Mauritius, United Kingdom, The Netherlands, France, USA and Australia) came to South Africa to discuss early science with the SKA pathfinder and precursor facilities. Special skills training sessions for the South African and international postgraduate students focussed on data analysis and reduction techniques using observations from the Karoo Array Telescope test array (KAT-7).

Group photo of the workshop in the Kruger National Park

Skills Training at the SKA workshop: Tsu-Shiuan Lin (UCT, MSc in Computer Science), Itumeleng Monageng (UCT/SAAO, MSc in Astronomy), second row: Mokhine Motsoaledi (UCT, PhD in Astronomy), Lizelke Klindt (UFS, BSc Hons in Physics), Avishek Dusoye

Inaugural Science Winter School - July 2013 by Assistant Dean Associate Professor David Gammon

Emeritus Professor George Branch engages with Winter School students in the teaching laboratory at the Two Oceans Aquarium

A first for the Science Faculty, was a **Science Winter School**, organised and run by the Assistant Dean, Associate Prof **David Gammon,** whose broader role in the Faculty this year has been to strengthen and augment the Faculty's interventions in supporting students in their studies in the sciences. The idea of holding a Winter School emerged from observations over the years that many students enter the Science Faculty without having a clear idea of what they want to do or why they are doing Science. For many students, Science is their second choice, having not secured a place in Medicine or Engineering, or simply not being aware of the range of options open to them. The Winter School was conceived to inspire and motivate, recognizing that we have a Faculty stacked with top scientists with interesting stories to tell and a region rich in scientific interest. Students were invited to apply for a limited number of places and were offered a week of accommodation , meals, and a scientific adventure, exposure to interesting science, and a chance for supervised revision of first semester work. 45 students participated, and the programme opened with a welcoming dinner in Smuts Hall on the Sunday evening, featuring the Dean, Professor le Roex, as guest speaker.

The week entailed excursions, talks and work sessions, such as spending a day at the Two Oceans Aquarium, where they received insight into the scientific and managerial issues facing this institution, listening to Emeritus Professor George Branch giving an account of the process of compiling his book "Living Shores of Southern Africa". They had animated lectures by physicists Andy Buffler, David Aschman, Jeff Fearon and Gregor Leigh, and a visit to the National Accelerator Facility in Faure; an introduction to "citizen cyberscience" from astronomers Kurt van der Heyden and Sarah Blyth (together with telescope viewing on the roof of RW James); a visit to the Planetarium; oceanographer Isabelle Ansorge introducing them to the new breed of oceanographer - female seals with devices attached to their heads for recording data on the southern oceans; geologist Emese Bordy providing the geological background and framework for engaging in the fracking debate; chemist David Gammon providing an overview of the challenges in the chemical and molecular dimensions of reality.

The students worked in groups, giving presentations on interesting problems or challenges, such as explaining why ozone is harmful to citizens in the city streets, but of great benefit to them when it's found in a layer in the stratosphere, the difference between petrol and diesel fuel and why you can't put diesel fuel in a petrol engine, how a cell-phone battery works, and what happens when you re-charge it every day. These working groups and course revision were facilitated by senior student tutors, who also served as role models and mentors. The camaraderie that developed manifested in the soccer game played on the penultimate day, featuring the Assistant Dean as a key, central mid-fielder, for at least five minutes before he started tiring! The students were unanimous in acknowledging the positive impact of the week and it's a concept that will be repeated: the reality is that young people today, particularly those from disadvantaged backgrounds, have very little real exposure to the world of science and its possibilities.

Last Laugh....