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SCIENCE @UJ

NEWSLETTER OF THE FACULTY OF SCIENCE

UNIVERSITY OF JOHANNESBURG

LEADING SCIENTISTS, INNOVATIVE TECHNOLOGISTS

THIS ISSUE FEATURES:

UNIVERSITY OF JOHANNESBURG

FACULTY OF SCIENCE

A Message from the Executive Dean, Prof Annah Moteetee

As we close the first semester of the 2024 academic year, I would like to extend my heartfelt gratitude to all members of our Faculty of Science community. Your hard work, dedication, and unwavering loyalty have been instrumental in our achievements over the past few months.

To our academic staff, thank you for your commitment to excellence in teaching and research. Your innovative approaches and unwavering dedication to providing an exceptional learning experience for our students are truly commendable. To our support staff, your invaluable contributions ensure the seamless operation of our Faculty, and your efforts are deeply appreciated.

For those of you who will be taking a well-deserved break, I wish you a restful and rejuvenating time off. May this period allow you to relax and recharge, ready to tackle the challenges of the upcoming semester with renewed energy.

For those who will continue to work during the recess, I extend my best wishes to you as well. Your ongoing efforts are vital to our continued progress and success, and I am grateful for your dedication.

As we look forward to the second semester, I am filled with optimism and excitement. Together, we will build on our achievements and confront new challenges with the same spirit of collaboration and excellence that defines our faculty.

Thank you once again for your exceptional efforts and dedication.

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Scaling New Heights: The Academy of Computer Science and Software Engineering Breaks Barriers

"The Academy of Computer Science and Sofware Engineering (ACSSE) has successfully maintained its prestigious international accreditation with BCS, The Chartered Institute for IT, based in London, UK, for the fifth consecutive term. This BCS accreditation is a testament to the high standards of our courses, offering recruiters confidence that our curriculum delivers relevant, up-to-date learning that meets the rigorous benchmarks set by the IT profession. This recognition affirms that our university's computing graduates are among the elite in their field."

"Oracle has generously agreed to fully fund six students, a remarkable opportunity made possible through the initiative of Mr. Maluleka Rhulani from the Academy of Computer Science and Software Engineering.

Mr Maluleka Rhulani, a lecturer at ACSSE, has been instrumental in securing this funding. His dedication to bridging the gap between academia and industry has resulted in this significant partnership. This initiative reflects Oracle's commitment to nurturing future talent and contributing to the tech industry's growth by investing in education and supporting young talent.

Overall, this funding not only alleviates the financial burden on the students but also opens up a world of opportunities for them, setting a solid foundation for their future careers. The partnership between Oracle and the Academy of Computer Science and Software Engineering models how industry and academia can collaborate to foster talent and drive technological advancement."

"Dr. Siphesihle Sithungu, a lecturer at the ACSSE, earned his doctoral degree at the impressive age of 31."

Department of Botany Celebrates Breakthrough Achievements in Plant Science Research and Innovation

"Prof. Ben-Erik Van Wyk has been named a finalist in the NSTF South 32 awards."

"Prof. Michelle Van der Bank has been awarded the SA Academy of Science and Culture's Medal of Honour for contribution to science in South Africa."

"Dr Ashton Welcome from the Botany and Plant Biotechnology department has been nominated and elected to serve on the South African National Plant Checklist Committee. The National Plant Checklist is maintained by the South African National Biodiversity Institute (SANBI) and forms the taxonomic backbone for botanical research projects in South Africa; the committee aims to ensure that the National Plant Checklist is maintained at an internationally acceptable standard."

Department of Zoology Marks Milestone Achievements in Wildlife Research and Conservation

"Prof Oldewage attended the 6th EMCI conference in Marrakesh and won best paper in the Track: Ecosystems and Biodiversity Conservation."

"Prof Oldewage has successfully obtained an NRF B-rating and Dr Dos Santos an NRF Y-rating."

Prof. Basie von Solms Ranks 5th globally among Cybersecurity Researchers

In an era of universal digital threats, the significance of cybersecurity research is paramount. Cyberattacks are becoming increasingly frequent and sophisticated, posing serious risks to individuals, businesses, and governments. Highlighting the importance of ongoing research and expertise in this field, Professor Basie von Solms from the University of Johannesburg (UJ) has recently been recognised as one of the top cybersecurity researchers globally.

Prof von Solms, who has dedicated 50 years to the study and teaching of Information and Cyber Security, has been ranked number 5 worldwide for his lifetime contributions to the field. This ranking by ScholarGPS reflects the significant impact and breadth of his research over the decades.

"Today, cybersecurity is more critical than ever," says Prof von Solms. "With technology advancing rapidly, the threats we encounter are continually evolving. Staying ahead requires ongoing research, innovation, and raising public awareness about the latest trends in cybercrime and how individuals can protect themselves against it."

Starting his career in the early 1980s, Prof von Solms has witnessed and contributed to the transformation of Information Security into what is now widely known as Cybersecurity. Alongside his research advancements, he has served as a mentor to over 30 doctoral students and numerous master's students, many of whom have focused their studies on Information and Cybersecurity.

Prof von Solms' impact reaches well beyond the confines of UJ. He has chaired esteemed international bodies such as the Technical Committee 11 (Information Security) of the International Federation for Information Processing (IFIP), subsequently assuming the role of its President. Furthermore, he has played an active role within the World Economic Forum's (WEF) Global Futures Council for Cybersecurity, where he continues to contribute as an expert in the field.

In addition to these roles, Prof von Solms serves as an Associate Director at the University of Oxford's Global Cybersecurity Capacity Centre and is a Board member of the Centre for Cybersecurity Capacity Centre of Southern Africa. His involvement with these institutions demonstrates his commitment to enhancing global cybersecurity capabilities.

Prof von Solms concludes: "The recognition by ScholarGPS is also a recognition of the collective efforts of my colleagues and students for continued dedication to cybersecurity research and education. Cybersecurity is not a solitary pursuit but a collaborative effort that requires constant vigilance and innovation."

For more information about Prof von Solms' work and his contributions to the field, please visit ScholarGPS.

-Story sourced from UJ News Media Release

Celebrating a Lifetime of Achievement in Natural Science and Technology Interview with Prof. Ian Dubery

The South African Academy of Science and Arts recently honoured Prof. Ian Dubery with the prestigious MT Steyn Medal, recognising his lifetime contributions to natural science and technology. Prof. Dubery expressed deep gratitude for this honour, emphasising the significance of being acknowledged for his extensive work as a scientist.

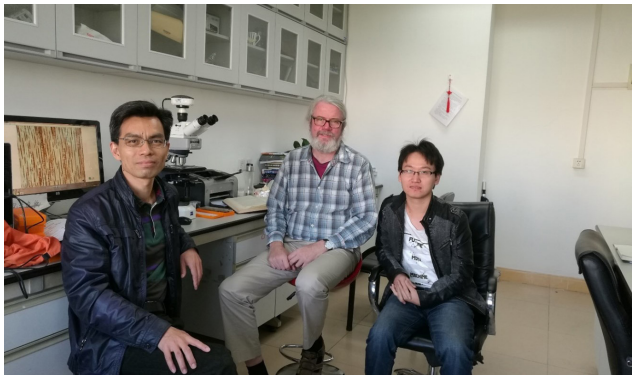
A profound fascination with biology and the life sciences drove Prof. Dubery's journey into the natural sciences and technology field. This passion has guided his career and fueled his numerous research endeavours. Currently, his work focuses on specialised plant metabolites, stress metabolism in plants, adaptive responses to environmental stresses, and the priming of natural defence mechanisms in plants. Central to his research is the study of metabolomics, which examines the entirety of biochemical compounds and their interactions within cellular metabolism.

The impact of metabolomics on plant science research is vast, particularly in the agricultural domain. Prof. Dubery's research contributes significantly to plant breeding technology and the understanding of disease resistance and resilience to environmental stresses. By identifying key metabolites and using advanced chemometric tools and modelling, his work facilitates the selection of metabolic features that enhance specific cultivars' properties. These biomarkers are instrumental in crop improvement, linking desired performance traits in plant breeding and enabling targeted profiling in metabo-phenotyping.

Looking to the future, Prof. Dubery emphasises the critical need for resilient and climate-smart crops to meet the increasing demands of global food production. The advancements in metabolomics tools and approaches present exciting opportunities for crop improvement and drug development from plant-derived natural products. In addition to his groundbreaking research, Prof. Dubery is committed to mentoring young researchers and students. He encourages them to read widely, cultivate scientific curiosity, and develop a questioning mind. He stresses the importance of mastering techniques in their field of interest, broadening their technical skills, and maintaining diligence and realistic ambitions with a strong sense of purpose.

As a retired Research Professor in the Biochemistry department at UJ, Prof. Dubery remains dedicated to completing ongoing projects and mentoring younger colleagues. Reflecting on the future of natural sciences and technology, he cites R.C. Bohinski, highlighting the profound potential of biochemical knowledge in advancing our understanding and manipulation of living organisms. He believes this holds the promise of remarkable achievements and significant progress in the coming decades.

Prof. Aleksei Oskolski's Publications in the Top 10 of Chinese Palaeontology



Prof Oskolski (UJ, center) with his collaborators Prof Jianhua (left) and Dr Luliang (right) at the palaeobotanical lab at the Sun Yat-sen University.

Two articles on fossil woods from South China, authored by Prof. Oskolski from the Botany and Plant Biotechnology Department in collaboration with researchers from Sun Yat-sen University and Xishuangbanna Tropical Botanical Garden, have been recognised by the Palaeontological Society of China as one of the top 10 achievements in palaeontology in China for 2023. These articles present the first paleontological evidence documenting the expansion

of the distribution range of subtropical trees during the last glaciation. This discovery holds significance for reconstructing the history of low-latitude vegetation during the late Ice Age and forecasting the future of modern plant species in response to ongoing climate changes.

It is commonly believed that Pleistocene glaciations, known as the Ice Age, led to the extinction of plant species or the drastic contractions of their ranges. This is true, but only partially: instead, the glaciations were favourable for many cold-tolerant plants. Today, these plants are found in the tundra or high in the mountains of the temperate zone in the Northern Hemisphere, but during the glaciations, their range extended far south. However, this was in the temperate zone. How did plants in lower latitudes survive the glaciations? The glaciers did not reach the tropics and subtropics, but the climate in these regions became colder and drier. It turns out that some plants from tropical mountains descended to the lowlands and widely expanded during this time. Prof. Oskolski, together with Prof Jianhua Jin, Dr Luliang Huang, Dr Weiye Huang Weiye and Dr Helanlin Xiang from Sun Yat-sen University in Guangzhou, and Prof Shfeng Li from Xishuangbanna Tropical Botanical Garden in Mengla (China) found the first paleontological evidence of this scenario for low-latitude plants. Their studies have been recognised by the Palaeontological Society of China as one of the top 10 achievements in palaeontology in China for 2023.

The researchers studied Pleistocene fossil woods near the Maoming town in southern China. These fossils belong to the trees which grew there about 30,000 years ago, before the Last Glacial Maximum. Careful examination of the structure of these woods allowed the researchers to determine these trees. Among them, the woods of Armand pine (*Pinus armandii*) and red lotus tree (*Magnolia insignis*) were identified. These trees are now found only in the mountains, far from the region where their remains were discovered. The scientists conducted the distribution modelling for these species based on paleoclimatic data. Its results confirmed that during the late Pleistocene, the climate around Maoming was favourable for these two species, but it became too warm for them during the Holocene.

Such complex studies combining the methods of traditional palaeobotany with the paleoclimatic reconstructions and species distribution modelling are important not only for unravelling the history of vegetation but also for predicting its future. The global warming that followed the last glacial maximum is very similar to current climate changes. Studying how plant species responded to past climate fluctuations is crucial for forecasting future vegetation changes and developing smart strategies of plant conservation. Professor Oskolski has been actively collaborating with paleobotanist Professor Jin Jianhua and his team from Sun Yat-sen University in Guangzhou since 2009. These researchers were pioneers in studying Paleogene and Neogene fossil woods of southern China. Their results allow for the reconstruction of the vegetation history of this region and the evolution of wood traits in response to past environmental conditions.

The Natural Science Collections Facility is digitising our JRAU herbarium collection.

The University of Johannesburg herbarium (JRAU) is a hidden gem on the third floor in D2 labs. It is a room full of dried, pressed plant specimens that are arranged according to their plant families (read more about what a herbarium is here).

Lucy Jennett (NSCF); Swinky Nkosi (NSCF); Maxine Manickum(NSCF); Dr Ashton Welcome (UJ); Ketelo Dinala (NSCF); Dr Ian Engelbrecht (NSCF); Given Leballo (NSCF).

The JRAU herbarium is a part of the Botany and Plant Biotechnology department and is curated by Dr Ashton Welcome. Dr Welcome and the department were privileged to host a team from the Natural Science Collections Facility (NSCF) who spent a full month imaging and barcoding the JRAU herbarium collection. There are over 15,000 specimens in the collection, so this was a massive job that would not have been possible without the NSCF team. Through the digitisation of herbarium and museum collections, more researchers have access to the valuable data that these specimens hold, and the data from our herbarium will soon be available to share with others. Contact Dr Ashton Welcome if you would like to visit the herbarium and find out more about the silent conversations that you could have in a silent place.

Tree Tagging on the Auckland Park campus

The Department of Botany and Plant Biotechnology, with funding from the University of Johannesburg Teaching Innovation Fund, has initiated a Tree tagging project on the Auckland Park campus. The honours students from the department have assisted Dr Ashton Welcome with mounting half of the tree tags so far, and the project is still underway. The aim of this project is to encourage students in different fields of study to learn about the trees around them. It will also encourage students and visitors to enjoy a tree walk around campus once the project is complete. The tree tags have the scientific names and the common names from different South African languages to ensure that all students feel connected to the nature around them.

Bathabile Dladla; Anathi Mkrweqe; Jessica Howard; Mandy Sibiya; Sinéad Watchorn. (Honours students in the Department of Botany and Plant Biotechnology)

Unexpected Blessings: A Graduate's Journey from Convocation to Delivery Room

Dr. Prudence Mashile's academic journey is a remarkable tale of innovation, perseverance, and unexpected joy. As she developed a groundbreaking recyclable biopolymer nanocomposite for wastewater treatment, her path to graduation was marked by relentless dedication and support from her loved ones. This article chronicles her research, the excitement of graduation day, and the unforgettable twist that turned her convocation into a day of dual celebrations. Join us in exploring the inspiring story of how Dr Mashile balanced the culmination of years of hard work with the surprise arrival of her newborn child.

1. Briefly tell us what your research is about

My research is dedicated to developing a recyclable biopolymer nanocomposite tailored for wastewater treatment. Comprised of hydrogel materials, this innovative biopolymer holds immense potential across diverse applications. My primary focus was on evaluating its effectiveness in eliminating pharmaceutical contaminants like beta blockers, anticonvulsants, and sulfanomides through adsorption processes.

Despite the invaluable benefits pharmaceuticals offer in advancing healthcare, their widespread use has introduced a concerning environmental challenge: water contamination. The discharge of these compounds into aquatic systems poses significant risks to both organisms and ecosystem integrity. As global pharmaceutical consumption continues to surge annually, the urgency for addressing this contamination issue grows more pressing.

Therefore, my research endeavours are driven by the imperative need for proactive and innovative solutions to mitigate pharmaceutical-related water pollution. By advancing the development of recyclable biopolymer nanocomposites, It contributed to the preservation of water quality and the protection of environmental health for present and future generations.

2. Tell us about your excitement and anticipation surrounding graduation day.

As I stand on the brink of graduation day, the excitement and anticipation coursing through me are electrifying. This moment represents not just the end of my doctoral journey but the culmination of years of relentless pursuit fueled by passion and dedication. From the very first day I embarked on this academic odyssey, I immersed myself wholeheartedly in the pursuit of knowledge, delving deep into the intricacies of my research field. Each breakthrough, every hurdle overcome, has been a testament to my unwavering commitment and resilience.

The thought of stepping onto that stage, clad in the ceremonial regalia, fills me with an overwhelming sense of pride. It's not just about receiving a piece of paper; it's a tangible recognition of the countless late nights, early mornings, and sacrifices made along the way. But beyond the pomp and circumstance of graduation day lies a

sense of anticipation for what lies ahead. Armed with the knowledge and skills forged through years of hard work, I'm poised to embrace new challenges and opportunities that await in the wider world. As I prepare to take this monumental step, I am deeply grateful for the unwavering support of my family, friends, and supervisors who have been my pillars of strength throughout this journey. Their belief in me has been a constant source of inspiration, propelling me forward even in the face of adversity.

So as I stand on the threshold of this momentous occasion, I do so with a heart brimming with gratitude, excitement, and anticipation for the bright future that awaits beyond the stage.

3. Talk about the culmination of years of hard work, the proud families in attendance, and the sense of accomplishment in the air.

I made a promise to my father that I would one day earn a PhD, but I underestimated the immense effort it would take to fulfil that promise. I began my PhD journey in 2019, and there were moments when I felt tempted to abandon the program altogether. Nights and weekends became dedicated to my studies, often causing me to miss important family gatherings and neglect the needs of my friends. Fortunately, I am blessed with a supportive network of family and friends who understood the sacrifices I had to make. My husband stood by me unwaveringly, accompanying me to the lab in the dead of night and patiently waiting for my experiments to conclude. Whenever doubts crept in, and I considered giving up, my father's voice of reason echoed in my mind. The year 2022 proved to be particularly challenging; I found myself at a standstill with my work and grappling with depression. Yet, having a supportive system proved invaluable during those dark times. I cannot overstate the importance of having a supportive supervisor who guided me through the toughest moments. As I stand here today, surrounded by my parents, in-laws, and husband, I am filled with overwhelming gratitude and pride. They have been with me every step of the way, witnessing the countless hours of dedication and perseverance I poured into earning this degree. This milestone is as much theirs as it is mine, a testament to the unwavering support and love that propelled me forward.

4. Describe your journey to graduation, your qualifications and where you obtained them, your struggles, triumphs, and dreams for the future.

I obtained a National Diploma and a B.Tech in Biotechnology from Vaal University of Technology. In 2016, I sought admission to the MSc in Nanoscience program at UJ for the 2017 academic year. However, I learned that due to changes in program requirements, B.Tech holders were no longer eligible. It was during this period that I had the fortune of meeting my supervisor, Prof P.N. Nomngongo, whose guidance profoundly influenced my trajectory. Subsequently, I enrolled in an MSc in Chemistry with a specialisation in environmental chemistry. My background in microbiology proved instrumental in shaping my research during this period. Initially feeling out of place transitioning from microbiology to chemistry, my confidence soared after receiving the 3rd prize for an oral presentation at the 2017 SACI Young Chemists Symposium, solidifying my resolve to pursue a PhD.

The PhD journey has been transformative, honing my analytical and problem-solving skills while fostering innovative thinking. I encountered challenges, particularly when experiments didn't yield expected results, leading to prolonged periods of troubleshooting that took a toll on my mental well-being. However, the elation of overcoming obstacles and finding solutions was unparalleled. Presenting my research at an international conference in Portugal in 2020 was a highlight, showcasing the culmination of years of dedication and perseverance.

Currently, I work as a data manager in a clinical research organisation, where I leverage my project management, data analysis, and problem-solving skills acquired during my PhD. While I aspire to continue advancing in my career, my immediate focus is on nurturing and supporting my family.

5. Provide details of the events of the morning of graduation day.

To capture the essence of this event, it's best to begin with the evening preceding the graduation ceremony. I had meticulously prepared my attire and treated myself to a manicure in anticipation of the milestone ahead. Meanwhile, my parents had embarked on a journey spanning 500 kilometres from their village, Buffelshoek in Acornhoek, Bushbackridge, to Johannesburg. The evening was filled with laughter and bustling activity as my mother and I engaged in lively conversation while tending to last-minute preparations, including grooming my hair extensions. We capped off the evening with a celebratory takeaway dinner.

In the early hours of the morning, around 3 am, I awoke to an unsettling sensation in my stomach. Speculating that it might be a reaction to the dinner, I casually mentioned it to my mother. However, she astutely suggested that I might be in labour, a notion I dismissed since my due date was still a month away. As the discomfort persisted, we eventually decided to seek medical attention at 5 am. Upon arrival at the hospital, it was confirmed that I was indeed in active labour. Despite the significance of the day, my doctor endeavoured to halt the progression of labour, mindful of my commitment to attend the graduation ceremony. I was administered medication in an attempt to stall the contractions, with the intention of briefly attending the ceremony before returning to the hospital.

Meanwhile, back at my apartment, my father and uncle eagerly awaited our departure for the graduation venue, dressed to the nines. The makeup artist I had enlisted reached out, inquiring about my whereabouts, while arrangements for lunch had to be swiftly cancelled. However, as the contractions subsided, it became apparent that returning home, dressing for the occasion, and making it to the ceremony in time were no longer feasible. I was advised to remain under observation, only for the labour to resume shortly thereafter. In the end, I welcomed a healthy baby boy weighing 3.21 kilograms, an unexpected but profoundly joyous addition to the day's events.

6. Some concluding remarks about your overall journey and having the opportunity to walk the stage

As I reflect on my journey, the moment of walking across the stage to receive my PhD is one that I had eagerly anticipated and one that my family had anxiously awaited. The sight of donning the iconic red gown symbolised the culmination of years of dedication, perseverance, and unwavering support from both my loved ones and the academic community at the University of Johannesburg. This achievement represents far more than just the acquisition of a degree; it embodies countless hours of tireless effort, intellectual growth, and personal development. It is a testament to the resilience and determination that carried me through the inevitable challenges and obstacles encountered along the way.

I am profoundly grateful to the University of Johannesburg for providing me with the platform and resources necessary to pursue my academic aspirations. The guidance and mentorship of my supervisors, the camaraderie of my peers, and the unwavering support of the university staff have all played an instrumental role in shaping my academic journey. As I prepare to embark on the next chapter of my life, I carry with me the invaluable lessons and experiences gained during my time at UJ. I am filled with gratitude for the opportunities afforded to me and look forward to applying the knowledge and skills acquired to make meaningful contributions to my field and society as a whole.

Seminars, Training & Engagements

On the 10th of May 2024, DMAM collaborated with Amazon for a career day event in Diepsloot. Dr Katlego Sebogodi, Dr Andrew Craig and Prof Farai Chirove went to Diepsloot and represented UJ at the event. The event aimed to share information regarding academic programs offered at UJ, campus culture and bursary information offered by Amazon to assist the current grade 12 maths and science learners in Diepsloot to make informed decisions about their educational journey and potentially drawing them to study at UJ and also hopefully consider STEM-related courses offered at UJ.

Dr Katlego Sebogodi, Dr Andrew Craig and Prof Farai Chirove not only gave speeches to motivate the learners in their academic journeys and disseminate information regarding qualifying to study at UJ, but they had a stall (organised by Ms Ntokozo Hlatshwayo) to engage with the learners and also organised mathematics quizzes were learners won prizes organised by DMAM community engagement led by Dr Sebogodi.

Prof. Kowiyou Yessoufou (GEMES) will host two inbound PhD students between July and September. Mr Yannick Akin is completing his PhD at the University of Parakou, Benin. He will be visiting for data analysis along with his supervisor, Prof. Orou Gaoue, a UJ visiting Professor. Ms Janet Olabode, from the University of Lagos, Nigeria, is a registered PhD student and will also visit for three months for data analysis. In August 2024, Prof. Kowiyou Yessoufou is invited to collaborate and give seminars at Umaru Yaradua University in Nigeria.