Programme

First Postdoctoral Conference of Southern Africa

... 100 years into the future!

organised by the

Postdoctoral Society Stellenbosch

to celebrate 100 years of education at Stellenbosch University

3 - 5 October

Stellenbosch Institute for Advanced Studies (STIAS)

Organised by the Postdoctoral Society Stellenbosch:
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.. and all participants!

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Prizes

Van Schaik Prizes for best presentations

- **R2500 Voucher** (1st Prize)
- **R1500 Voucher** (2nd Prize)
- **R1000 Voucher** (3rd Prize)

Van Schaik Prize for best poster

- **R1000 Voucher**

Lanzerac Prizes for best questions from audience

- **Wine and Chocolate tasting**
- **Breakfast**

Schedule

	Wednesday, 3 October
17:30 – open	Welcome Cocktail at Stellenbrau Early Registration
18:00	Opening by Prof Eugene Cloete, Vice-Rector
	Thursday, 4 October
08:15 – 08:40	Registration, Coffee
08:40 – 09:15	Keynote Address by Prof Wim de Villiers, Rector
09:15 – 10:30	Oral Session – African History and Society
10:30 – 11:00	Break
11:00 – 12:30	Oral Session – Medical and Health
12:30 – 13:30	Lunch
13:30 – 14:45	Oral Session – Development
14:45 – 15:15	Break
15:15 – 17:00	Workshop - Food Security
17:00 – open	Dedicated Poster Session
	Friday, 5 October
08:30 – 09:00	Registration, Coffee
09:00 – 10:30	Oral Session – Education
10:30 – 11:00	Break
11:00 – 12:30	Oral Session – Medical and Health
12:30 – 13:30	*Group Photo* | Lunch
13:30 – 14:00	Plenary Talk – Artificial Intelligence (Stuart Reid)
14:00 – 15:00	Oral Session – Technology, Biology and Agriculture
15:00 – 15:30	Break
15:30 – 18:00	Workshop – Climate Smart Agriculture
18:00 – open	Closing

Workshop

Skyscrapers and sky-gardens: perspectives on urbanization and climate smart agriculture

Host: *Bianke Loedolff*

The double burden of climate change and food insecurity has led to an integrated, more comprehensive approach to address these growing concerns. Climate smart agriculture (CSA) calls upon intervention strategies that go beyond new technologies such as drought-resistant crops or precision farming. It requires and aims to include ecosystems (ie. soil and water), landscapes, land availability, socio-economic enhancement and value chain (amongst other non-traditional areas). The demand for innovation and solution-driven approaches requires multi-disciplinary discussions and this workshop thus aims to attract participants from across all disciplines to discuss a growing concern around urbanization, climate change and food security. From one century to the next: how do we contribute to CSA as an integrated, solution-driven approach?

A range of inspirational speakers will present at the workshop to engage the audience with past and future perspectives, including

(i) *Prof Danie Brink*, Dean of AgriSciences at Stellenbosch University;

(ii) *Prof Jennifer Thomson*, development of genetically modified maize, founding member of SAWISE, current president of OWSD, recipient of the 2004 L'Oreal-UNESCO Award for Women in Science, honorary doctorate from the Sorbonne,

Emeritus Professor of Microbiology in the Molecular and Cell Biology Department, University of Cape Town;

(iii) *Mr Willem Botes*, research leader at Stellenbosch University's Plant Breeding Laboratory, now also an International Wheat Yield Partnership (IWYP) aligned project – the only one of its kind in South Africa;

(iv) *Prof Jill Farrant*, a leader in the field of plant responses to water deficit stress, recipient of the 2012 L'Oreal-UNESCO Award for Women in Science, NRF A-rated researcher and SARChI Chair, Molecular and Cell Biology Department, University of Cape Town;

(v) *Prof Ed Rybicki*, Director URC Biopharming Research Unit, Molecular and Cell Biology Department, Institute of Infectious Disease and Molecular Medicine, University of Cape Town;

(vi) *Mr Brandon Paschal* (head of incubation at Launchlab) and *Mr Joubert De Wet* (technology transfer manager, InnovUS), representing key innovation drivers for business establishments.

Subsequent to the presentations, the audience and speakers alike will participate in meaningful discussions to address critical perspectives on CSA and urbanization. Entrepreneurs have also been invited to participate in discussions around innovation and business lessons learned. The workshop hopes to not only reach and stimulate the audience to draw inspiration from experience, but also to foster networking and build the bridges to new ideas.

Programme

Wednesday (3 October)

Cocktail at Stellenbrau Brewery — from 17:30
The Woodmill Lifestyle, Vredenburg Rd, Stellenbosch

Keynote Address by **Prof Eugene Cloete**, — 18:00
Vice-Rector Stellenbosch University
Research, Innovation & Postgraduate Studies

Networking and Registration

Thursday (4 October)

Second conference day at STIAS

Stellenbosch Institute of Advanced Studies, 10 Marais Road, Stellenbosch

Coffee and Registration	08:15 - 08:40
Keynote Address by **Prof Wim de Villiers**, Rector Stellenbosch University	08:40 - 09:15

Oral Session African History and Society
Chair: *Mpho Tlale*

Lizette Grobler 09:15 - 09:30
(Stellenbosch University, Law)
Idleness and Public Property: Vagrancy, loitering and negating belonging

Linet Imbosa Muhati-Nyakundi 09:30 - 09:45
(University of Johannesburg, Psychology)
Voicing invisible' childhood vulnerabilities in poor urban settings.

Cristiano d'Orsi 09:45 - 10:00
(University of Johannesburg, SARCIL)
The African responses to the present refugee crisis: realities, challenges and hopes

Erasmus Masitera 10:00 - 10:15
(University of Johannesburg, Philosophy)
Traditional Social Therapy as the Centre of Ubuntu Philosophy.

Oral Session Medical and Health Sciences
Chair: *Caitlin Uren*

Vicky Baillie 11:00 - 11:15
(University of Witwatersrand, RMPRU)
Unravelling specific causes of neonatal mortality using minimal invasive tissue sampling: An observational pilot study.

Saheed Sabiu 11:15 - 11:30
(University of the Free State, Biochemistry)
Biomembrane stabilization, in silico analysis and kinetics of inhibitory potential of epicathecin and procyanidin B from Chrysophyllum albidium seed cotyledon against key enzymes linked to carbohydrate metabolism

Olugbenga Oluwagbemi 11:30 - 11:45
(Stellenbosch University, Mathematical Sciences)
A Comparative Computational Genomics of Ebola Virus Disease Strains: In-silico Insight for Ebola Control

Nadine Cronjé 11:45 - 12:00
(Stellenbosch University, Pathology, Medical Virology)
Surveillance of South African bat populations reveals diverse coronaviruses and potential for improving screening assays

Maaike Eken 12:00 - 12:15
(Stellenbosch University, Orthopaedic Surgery)
Relationship between functional mobility and lower extremity muscle strength in adults with cerebral palsy; 30 years post orthopaedic interventions

Kim Martin 12:15 - 12:30
(Stellenbosch University, Physiological Sciences)
Designing appropriate in vitro models for skeletal muscle regenerative strategies; Opportunities and arguments for multidisciplinary research as a Postdoc

Oral Session Development and Economy
Chair: *Lizette Grobler*

Mpho Tlale 13:30 - 13:45
(Stellenbosch University, Public Law)
Securing rural land rights as a means to an end, the insecurities of the South African communal land tenure system

Rose Mathafena 13:45 - 14:00
(Unisa Business Leadership)
Towards the proactive management of employee wellbeing: culture, policies and practices as the drivers and enablers.

Lara Christina Roll 14:00 - 14:15
(North-West University, Optentia)
Job Insecurity in South Africa's Higher Education

Laura Weiss 14:15 - 14:30
(North-West University, Optentia)
The postgraduate journey: An explorative study on the experiences and narratives of postgraduate students and supervisors at a South-African University

Workshop — Food Security

Ethel E. Phiri, Anouk J. Albien 15:15 - 17:00
(Stellenbosch University, Agronomy)
One village's weeds are another's meal: is it possible to conserve edible weeds for future food security?

Poster Session

Andrea K Daniels 17:00 - 19:00
(North-West University, Psychology)
Determining the need for enhanced mobility programmes and therapies [complementary care] in psycho-physically vulnerable populations, including people living with HIV/Aids

Abigail Chivandi 17:00 - 19:00
(University of the Witwatersrand, Tourism)
Antecedents of "Service Quality", Service Business Innovation Model Performance in Tourism/Hospital sector:A new trend perspective.

Petros Muchesa 17:00 - 19:00
(University of Johannesburg, Health Sciences)
Prevalenceof clinically relevant bacteria from surface sources of a pediatric burns unit in South Africa

Depika Dwarka 17:00 - 19:00
(University of KwaZulu-Natal, Human Physiology)
Pharmacotherapeutic properties of Strelitzia nicolai aril extract containing bilirubin

Kaminee Maduray 17:00 - 19:00
(University of KwaZulu-Natal, Human Physiology)
The immunological effect of plasma derived exosomes from pre-eclamptic women on human placental bewo cells under hypoxic conditions

Pandiyan Arunagiri 17:00 - 19:00
(University of Kwa-Zulu Natal, Medical Sciences)
Investigating the potential bioprotective effects of diosgenin in high glucose induced stressed HEK 293 cells

Brigitte Glanzmann 17:00 - 19:00
(Stellenbosch University, Biomedical Tuberculosis Research)
Exome sequencing approach for combined immunodeficiency identifies a novel mutation in MAP3K14

Roksana Majewska 17:00 - 19:00
(North-West University, Environmental Sciences / Management)
Hitchhiking across the oceans: a summary of a 3-year study on sea turtle-associated diatoms

Friday (5 October)

Second conference day at STIAS

Stellenbosch Institute of Advanced Studies, 10 Marais Road, Stellenbosch

Coffee and Registration	08:30 - 09:00

Oral Session Education
Chair: *Daniel Nickelsen*

Peter Neema-Abooki 09:00 - 09:15
(University of Johannesburg, Education)
Cross Border Education and its Influence on the Quality of Higher Education

Lucia Munongi 09:15 - 09:30
(University of Johannesburg, Educational Psychology)
'We must stop talking about rights, instead talk about responsibilities. . . ': Perceptions of urban high school teachers on children's rights in Johannesburg, South Africa

Paul Munje 09:30 - 09:45
(University of the Free State, Education)
An exploration of the school feeding scheme in disadvantaged primary schools in South Africa

Yinusa Faremi 09:45 - 10:00
(University of the Free State, Education)
Peer group and parenting styles influencing teenagers' deviant behaviour in secondary schools

Olugbenga Ige 10:00 - 10:15
(University of the Free State, Education)
School-based Cybersecurity Education Programme for Schoolchildren in South Africa! A Timely Call from Bloemfontein

Remeredzayi Gudyanga 10:15 - 10:30
(University of the Free State, Education)
Transitioning between reforms: Physical sciences teachers' perspectives on the practical component of CAPS

Oral Session Medical and Health Sciences
Chair: *Olugbenga Oluwagbemi*

Caitlin Uren 11:00 - 11:15
(Stellenbosch University, Biomedical Sciences)
Signals of positive selection in immune response genes of an admixed southern African population

Danicke Willemse 11:15 - 11:30
(Stellenbosch University, Biomedical Sciences)
A cluster for an iron-sulphur cluster synthesis regulator

Richard Mbi Beteck 11:30 - 11:45
(Rhodes University, Chemistry)
Quinolone-hiosemicarzones/hydrazone: Synthesis and anti-TB evaluation

Samson Adeyemi 11:45 - 12:00
(University of the Witwatersrand, Pharmacy / Pharmacology)
Novel Anti-proliferative Activities of Folate-decorated Endostatin-loaded Nanoparticulate System in Oesophageal Squamous Cell Carcinoma

Rispah Torrorey-Sawe 12:00 - 12:15
(Stellenbosch University, Pathology)
Identification of a novel pathogenic BRCA2 mutation (c.5159C>A, S1720) and several variants of uncertain significance in Kenyan breast cancer patients*

Amber Khan 12:15 - 12:30
(University of Witwatersrand, Internal Medicine)
Synthetic High Mobility Group Box 1 inhibitors arrests cell cycle in colorectal cancer cells

Plenary Talk

Stuart Reid 13:30 - 14:00
(NMRQL Research, Stellenbosch)
Artificial Intelligence and its potential impact on the future of research, work, and the economy

Oral Session Technology, Biology and Agriculture

Chair: *Natasha Mothapo*

Mpho Enoch Sithole 14:00 - 14:15
(Sefako Makgatho Health Sciences University, Physics)
Electrical Characterization of Tungsten-doped Gallium Antimonide Schottky Barrier Diodes

Vikas Kumar 14:15 - 14:30
(Stellenbosch University, Biochemistry)
Multifaceted biomolecules for the advanced nanotechnological applications

Sixberth Mlowe 14:30 - 14:45
(University of Zululand, Health Sciences)
Cashew nut shell liquid and castor oils as valuable bio-resources for the production of chemicals, materials and fuels

Roksana Majewska 14:45 - 15:00
(North-West University, Environmental Sciences / Management)
Hunting for a treasure at the museum: how zoological collections can contribute to epizoic diatom exploration

Workshop — Climate Smart Agriculture

Bianke Loedolff 15:30 - 18:00
(Stellenbosch University, Plant Biotechnology, Genetics)
Skyscrapers and sky-gardens: perspectives on urbanization and climate smart agriculture

Speakers:
Danie Brink
Jennifer Thomson
Willem Botes
Jill Farrant
Ed Rybicki
Brandon Paschal
Joubert De Wet

Closing

Cocktail at the Manor House at STIAS from 18:00

Abstracts

One village's weeds are another's meal: is it possible to conserve edible weeds for future food security?

Ethel E. Phiri, Anouk J. Albien

Stellenbosch University, Agronomy

Weeds are species from wild or semi-cultured plants that are usually problematic in food crops, leading to reduced yields. According to the Food and Agriculture Organization (FAO), there are approximately 30 000 species of weeds that account for losses in the yield of major crops including tobacco and wheat, various vegetables, fruit, and vineyards. Because of this, billions of dollars are spent each year on weed control in agroecosystems. However, as much as weeds need controlling for the protection of major crops, there are many weeds that are edible, indigenous, and are utilised by local communities. In commercial farming settings, weeds are completely ignored with regards to their positive contribution towards food security. For example, the genus Amaranthus, which includes approximately 70 species, is considered a cosmopolitan weed with associated invasion in agroecosystems after soil disturbance and seed exposure to light. While many commercial farmers in Africa, and especially in in South Africa, struggle to control the weed, in other African countries, Amaranth (pigweed, morogo, umno, or African wild spinach) is a nutritious food source that is high in protein and starch (grain), as well as minerals and vitamins (leaves). Historically, weed research has focussed on the control / destruction of agricultural weeds, including many species of edible morogo.

However, with the threat of global climatic change, it is predicted that many cultivated crops' yields will decrease because they have not been cultivated for their ability to withstand extreme weather conditions. In contrast, indigenous edible weeds

are able to withstand severe weather conditions and manage to thrive in the wild without any human intervention. Therefore, the aim of this proposed workshop is to assess the socio-cultural beliefs that may prevent the maximum utilisation of weeds as potential food source and to form a working group that will systematically debunk beliefs or myths that may prevent a source of nutrition from being utilised in under- or malnourished communities worldwide. In addition, this workshop aims to develop an integrated trans-disciplinary strategy to promote traditional edible weeds as commercial produce to combat future food insecurity, which is fast becoming a reality in Africa. A roundtable discussion will be utilised to put together a task team that is willing to engage with various role players and stake holders in various contexts and communities to begin addressing this issue and assessing the potential implications of weeds for future food security.

Keywords: edible weeds, food insecurity, germplasm conservation, orphaned crops, socio-economy

This research was supported by the National Research Foundation

Skyscrapers and sky-gardens: perspectives on urbanization and climate smart agriculture

Bianke Loedolff

Stellenbosch University, Institute for Plant Biotechnology, Department Genetics

However, with the threat of global climatic change, it is predicted that many cultivated crops' yields will decrease because they have not been cultivated for their ability to withstand extreme weather conditions. In contrast, indigenous edible weeds are able to withstand severe weather conditions and manage to thrive in the wild without any human intervention. Therefore, the aim of this proposed workshop is to assess the socio-cultural beliefs that may prevent the maximum utilisation of weeds as potential food source and to form a working group that will systematically debunk beliefs or myths that may prevent a source of nutrition from being utilised in under- or malnourished communities worldwide. In addition, this workshop aims to develop an integrated trans-disciplinary strategy to promote traditional edible weeds as commercial produce to combat future food insecurity, which is fast becoming a reality in Africa. A roundtable discussion will be utilised to put together a task team that is willing to engage with various role players and stake holders in various contexts and communities to begin addressing this issue and assessing the potential implications of weeds for future food security.

Field of research: agriculture

Idleness and Public Property: Vagrancy, loitering and negating belonging

Lizette Grobler

Stellenbosch University

Since its inception in the fourteenth-century England, vagrancy law has been justified as a measure to counter trespass and idleness. Consequently, it was also used to rationalise and bolster the colonial project along with pass laws, taxation and masters and servants legislation.

As part of the colonial heritage of Africa, vagrancy laws criminalising idleness and disorderliness still form part of existing legislation. These laws originated in England's Vagrancy Act of 1824 and remain in the penal codes and by-laws (prohibiting loitering) of former British colonies. Globally, vagrancy laws subsequently became the subject of constitutional scrutiny due to their tendency to typify a specific action or inaction as illegal and to criminilize as Ocobock (2008) notes the "personal condition, state of being, and social and economic status" of offenders. With the adoption of The Principles on the Decriminalisation of Petty Offences by the African Commission on Human and Peoples' Rights in November 2017, the reconsideration of vagrancy and loitering has become immanent to African legislators. Earlier this year, in the UK, a Windsor council leader demanded that the "epidemic of rough sleeping and vagrancy in Windsor" needed to be addressed before the Royal Wedding since it also "presents a beautiful town in a sadly unfavourable light". He suggested that the 1824 Vagrancy Act and the 2014 Anti-Social Behaviour, Crime and Policing Act" be used to clear the area of homeless people.

This contribution traces the history of vagrancy law, investigates how vagrancy and anti-loitering provisions still currently criminalize the use of public property and questions the discourse and rhetoric embedded in existing legislation utilizing

contemporary property theory.

Keywords: vagrancy, law, idleness, decriminalisation, loitering

This research was supported by National Research Foundation

Voicing invisible' childhood vulnerabilities in poor urban settings.

Linet Imbosa Muhati-Nyakundi

University of Johannesburg, Psychology

Low resourced urban settings in sub-Saharan countries expose children to many untold risks daily which affect their general wellbeing as a result of overcrowding. Major cities continue to be suctions of immigrants who prefer to settle in cheaper suffocating low resourced informal settlements. With numerous complex social and economic challenges in these settlements which include HIV/AIDS, drug, domestic violence, poverty, crime, murders, mental health issues, poor nutrition, unemployment, perpetual service delivery protests among others, children born in such environment experience varying vulnerabilities. To conceptualisation their lived vulnerabilities in particular contexts, it is necessary to identify risk factors in urban communities by making them visible. It is also important to understand any existing protective mechanism that interact with these risk factors. There is scanty research information on how experiences of vulnerability for younger children in urban settings within sub-Saharan Africa are studied, thus offering very little work for comparison. This paper explores childhood vulnerabilities and specific protective processes within poor urban settings in Kenya and South Africa, from children's perspectives. The paper draws on a recent study on preschoolers in Nairobi, Kenya and an ongoing study on ECD centres within Johannesburg, South Africa where qualitative methods were utilised. This paper reflects on the need to have methods that provides voices to invisible childhood vulnerabilities within urban communities; while acknowledging that each individual child is embedded in a unique context within many other contexts in urban environment.

Field of research: psychology

The African responses to the present refugee crisis: realities, challenges and hopes

Cristiano d'Orsi

South African Research Chair in International Law
(SARCIL)/University of Johannesburg

In the last few years, Europe is witnessing an increasing flow of asylum-seekers knocking at its door to flee real or alleged persecutions in their countries of origin.
A passionate debate is taking place both in the European political institutions and European civil society regarding the genuineness of the claims of the asylum-seekers and the policies to actuate in order to allow a reception that could take into consideration the needs of both the foreign guests and the host societies.
If a proportion of asylum-seekers is coming from the Near and Middle-East, where an end to the turmoil does not seem sight, another, even greater number of asylum-seekers is coming from the south, from Africa, often part of the phenomenon of 'boat-people', who disembark on the shores of Sicily, Calabria, Canary Islands or Andalusia from Libya, Mauritania or Senegal or, to a lesser extent, Morocco and Tunisia.
Put like this, it seems that the African continent represents exclusively a 'sender of people' to Europe, not having any viable strategy to contain this 'haemorrhage' of individuals travelling north. However, this is only a partial truth.
That it is why my presentation will deal with the 'refugee crisis' focusing on the 'south shore' focussing on the legal and policy measures put in place by the African countries not only to limit the flow of people towards the north but also on handling the massive flow of asylum-seekers in their own countries.
I will outline, first, that the majority of African asylum-seekers

movement is 'intra-African', that means that they mostly leave their own country not to undertake a journey to Europe but, more often, they simply move in groups via land to a neighbouring country. This affirmation is supported by figures. According to the most recent Global Trend published United Nations High Commissioner for Refugees (UNHCR), at the end of 2016 the entire African continent counted 5,531,693 refugees against the 2,300,833 refugees in Europe.
Hence, my presentation will highlight all the measures, both policy and legal, adopted by the main actors (local governments, regional and sub-regional organizations, in collaboration with UNHCR, the International Organization for Migration (IOM) and other important stakeholders on the ground, both governmental and non-governmental) in Africa to mitigate (or even to try to halt) this plight.

Keywords: africa, refugees, burden-sharing

Traditional Social Therapy as the Centre of Ubuntu Philosophy.

Erasmus Masitera, T. Metz

University of Johannesburg

In this essay I challenge the colonial epistemologies perpetuated in contemporary social practice of conceptualizing an individual as isolated from the (African) community. The individuation of the individual has resulted in destruction of the 'sociality' in social practices; that is traditional view that says an individual is an integral part of the society who cannot thrive and exist without others. In other words, the Ubuntu conception of the individual was distorted by colonial systems and practices thus rendering Ubuntu insistence on the prioritisation of the community as banal. Ubuntu social system is human-centred (that is concerned with the whole community in totality) rather than being only person-centred; this kind of thinking is a result of social knowledge and experiences. As a result, transgressions and human faults are not considered as aimed at and committed against the individual but at the community at large. The primacy of community comes into being particularly in the aim of achieving and treating each other humanly as much as we can (justice and human goodness). In the same vein correcting of such transgressions are community based and directed by the community underpinned by community experience; whereas for the colonial system correction is done at a personal level and highly impersonal as well. This produces fragmentation and marginalization and possibly perpetuates resentment, resistance and non-integration of the individual into the community. This is a major fault of the colonial system which the paper argues against.

Overall, I will seek to explore and understand the conception of the individual and community in Ubuntu ethic, Ubuntu ethic, Ubuntu ethic in the process of correcting transgressions and

underlying Ubuntu social knowledge and experience. My ultimate goal is to provide ideas for transformation in social and justice systems and influence policies in that regard.

Keywords: ubuntu ethic, social therapy, individual, community, human centred, reconciliation

Unravelling specific causes of neonatal mortality using minimal invasive tissue sampling: An observational pilot study.

Vicky Baillie

University of Witwatersrand, RMPRU

Forty-five percent of childhood deaths occur within the first month of life and almost all of them occur in low-middle income countries (LMIC). The majority of cause of deaths (CoD) are inferred from limited vital registration and verbal autopsy data which can only attribute CoD at the syndromic level. Furthermore, most emphasise is placed on identifying the underlying medical conditions believed to have predisposed to death; however, this approach overlooks the immediate CoD, including infections which could have been treated and thus the death averted. The identification of infections is further overlooked due to the scarcity and challenges surrounding post-mortem investigations in children from LMIC including paucity of pathology-capacity, resource-constrains, cultural practices and religious beliefs. Whereas, minimally invasive tissue sampling (MITS) have been shown to be more acceptable in LMIC settings and are successfully able to determine the CoD especially when due to infectious pathogens. We aimed to determine the ability of MITS, together with antemortem clinical data, to ascertain the underlying and immediate CoD among neonates in South Africa.

Deaths occurring in the neonatal wards were identified and grief counselling offered to the parents prior to enrolment into the study. Following informed consent, the MITS procedure was performed whereby tissue biopsy were taken from the brain, lungs and liver. Cerebrospinal fluid and blood was also collected. All samples underwent microbiological culturing, histopathology and molecular testing. These results, together with the patient medical records were reviewed by an international panel

group to determine the underlying and immediate CoD including listing the most likely infectious pathogen.
Of the 233 eligible cases, 153 (66%) were enrolled into the study – 77%, 79% and 10% were born with low birth weight (<2500g; LBW), preterm or had significant congenital abnormalities respectively. Overall, 63% of cases cultured a potentially pathogenic organism with Acinetobacter baumanii (31%) and Klebsiella pneumonia (18%) being most prevalent. By PCR, Escherichia coli was the most commonly detected pathogen in the blood, CSF and lung samples (9%, 4% and 10% respectively) followed by Staphylococcus aureus (8%, 1% and 7% respectively) and cytomegalovirus (4%, 3% and 7% respectively). The most common underlying CoD was "LBW/prematurity" (53%), "complications of intrapartum events" (15%), "congenital malformations" (13%) and infection related (10%). 70% of LBW/prematurity had infection as immediate CoD with sepsis (42%), pneumonia (32%) and meningitis (3%) being the most common diagnosis. The majority of these were nosocomial-acquired infections (88%, 92% and 0% respectively) including A.baumanii (52%), K.pneumonia (22%) and S.aureaus (21%). The leading causes of community-acquired infections were Group B Streptococcus (22%), E.coli (17%) and S.aureaus (9%).
MITS were widely acceptable in the study setting with 2/3 of legal guardians consenting to the procedure. The majority of underlying CoD were due to LBW/prematurity which could have been determined through verbal autopsy. However, MITS were able to also determine the immediate CoD, the majority of which were due to infectious pathogens, in particular nosocomial infections, and consequently the death could have potentially be avoided. Thus MITS investigations into the causes of these deaths allows for future intervention strategies to reduce under-5 mortality.

Field of research: medical sciences

Biomembrane stabilization, in silico analysis and kinetics of inhibitory potential of epicathecin and procyanidin B from Chrysophyllum albidium seed cotyledon against key enzymes linked to carbohydrate metabolism

Saheed Sabiu, Frans Hendrik O'Neill

University of the Free State, Biochemistry

The global upsurge in the prevalence of diabetes mellitus (DM) has remained a key health threat with significant economic burden. Although, conventional oral hypoglycaemic drugs have been effective in the management of DM, their high cost and significant adverse effects have undermined their usage. Little wonder, new and emerging evidence-based phytotherapeutic studies geared towards diabetes management are now exploring more affordable and easily accessible flavonoid-containing natural plant formulations. This study evaluated the membrane stabilization and mechanisms of hypoglycaemic potential of a flavonoid-rich extract of Chrysophyllum albidium seed cotyledon through inhibition of the specific activities of α-amylase and α-glucosidase in vitro and in silico. The extract was separately incubated with α-amylase and α-glucosidase and subsequently with starch and p-nitrophenylglucopyranoside respectively, while the in silico molecular docking was performed using the PyMOL tool. The mode(s) of inhibition of both enzymes was subsequently determined using Lineweaver-Burk plots. The data obtained showed that the extract had respective competitive and uncompetitive inhibitory influence on α-glucosidase and α-amylase with overall half-maximal inhibitory concentration values of 0.700 and 0.699 mg.mL-1 relative to that of acarbose (0.048 and 1.539 mg.mL-1). The extract also

markedly halts free radicals in a manner comparable to silymarin. The extract was 75.19 and 69.78% potent against hypotonic and heat-induced hemolysis of bovine serum erythrocytes respectively. The extract could thus be said to have shown significant membrane stabilization activity. The effects shown by the extract at the investigated concentrations may be attributed to its flavonoids (epicathecin and procyanidin B) as revealed by the results of the FTIR and HPLC analyses. Furthermore, the molecular docking results are consistent with the in vitro analysis and showed strong binding affinity with alpha-glucosidase (epicathecin: -10.00 kcal/mol, procyanidin B: -7.50 kcal/mol) and alpha-amylase (-8.10 kcal/mol, procyanidin B: -9.15 kcal/mol). Put together, besides being antioxidative, modulation of the specific activities of the enzymes linked to carbohydrate metabolism are its probable mechanisms of hypoglycaemic potential and has provided baseline evidence for its antidiabetic application.

Keywords: α-amylase, α-glucosidase, acarbose, chrysophyllum albidium, competitive inhibition, epicathecin, hypoglycaemic

A Comparative Computational Genomics of Ebola Virus Disease Strains: In-silico Insight for Ebola Control

Olugbenga Oluwagbemi, Awe Olaitan

Stellenbosch University

Background
Ebola Virus Disease (EVD, henceforth), is major public health problem in some affected countries. It is also a potential global public health pandemic. The menace of the disease outbreak among some Western and Central African nations, in recent years, has resulted in the death of many unsuspecting victims. After a major outbreak in the year 2014, EVD has subsequently re-emerged in some African countries.
Method
Four online databases (Science Direct, Google Scholar, Springer-Link and PubMed), were extensively searched, for research articles published between 2008 and 2018, on EVD control studies. These articles were systematically reviewed. Outcomes were summarized and classified. In addition to this, five different strains of ebola virus (Reston, Bundingbugyo, Zaire, Sudan and Tai forest ebolavirus) were obtained from the NCBI database, specifically the Entrez Genome database. Bioinformatics analysis was performed on these ebola genome sequence, by using Muscle software, RawXL, Treview, iTOL and Clustal X. Evaluation of the phylogenetic tree was performed by using MEGA X and PHYLIP software.
Results
104 research articles fulfilled the inclusion criteria out of 237,498 publications that were identified. 23 articles focused on vaccine-related Ebola control research, 12 on modeling and simulation-related ebola control research, 41 on drugs and therapeutics-related ebola control research, and 28 on other experimental

studies. According to the results obtained, there exist very few modeling and simulation studies have been conducted on the control of EVD in the last 10 years. Thus, there is the need for more modeling and simulation-related ebola control research. Taiforest ebolavirus and Bundibugyo ebolavirus are closely related, while Sudan and Reston ebolavirus are also closely related. Zaire ebolavirus looked different from them all. These can facilitate the development and production of joint, multi-protective, multi-treatment drugs and vaccines against these ebola virus strains. Results from the evaluation of the phylogenetic tree, can help provide insight on the origin, evolution, possible structural and genetic mutations of these Ebola virus, towards the control of the disease.

Keywords: comparative genomics, ebola virus disease, in-silico, insight, ebola control

This work is based on the research supported partly/wholly by the National Research Foundation (National Research Foundation) of South Africa, (With Grant Number: UID: 111988) of the DST/National Research Foundation Innovation Postdoctoral Research Grant, awarded to Olugbenga Oluwagbemi

Surveillance of South African bat populations reveals diverse coronaviruses and potential for improving screening assays

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Coronaviruses (CoVs) are RNA viruses encompassing four genera. The alpha- and beta-CoVs commonly cause mild disease in humans. However, outbreaks of severe respiratory disease in 2002 and 2012 led to the identification of two highly pathogenic human beta-CoVs, SARS- and MERS-CoV, respectively. Bats are considered ancestral hosts for all mammalian alpha- and beta-CoVs and a wide diversity of bat CoVs has been described worldwide.

From South African bats, only 15 alpha-CoV sequences and 2 beta-CoV sequences have been reported. Phylogenetic inference shows that the beta-CoVs, from Neoromicia capensis bats, belong to the same viral species as MERS-CoV. Working in transdisciplinary collaboration with ecologists and zoologists, this study aimed to describe the CoV diversity within South African bat populations.

During a general surveillance effort, 404 bat faecal pellets were screened using two different PCR assays, one using a single set of primers and the other using three sets of lineage-specific primers, targeting a conserved region of the CoV genome. An additional 183 faecal pellets, collected from N. capensis bats, were screened as part of a species-specific surveillance study. Following notable discrepancies in the detection rates of the two screening assays used, an assessment of several different published CoV screening assays, using single primer sets, was conducted. This used in vitro transcribed RNA controls representing several different bat CoVs detected during the study in serial dilutions from 10^7 to 10^1 RNA molecules per reaction.

Overall, 85 positive samples were identified. Based on putative CoV

species classification criteria, the general surveillance effort detected nine CoV species, eight alpha-CoVs and one MERS-related beta-CoV, from eight different bat species. The species-specific surveillance detected three CoV species, including MERS-related beta-CoVs, and identified several instances of coinfection with two different CoVs. Using lineage-specific primers to screen samples not only detected an additional 34 CoVs missed by the standard screening PCR assay, but also generated longer sequence fragments for improved phylogenetic analyses. The subsequent assessment of published PCR screening assays indicated that some single primer set based screening assays were better than others but no one primer set could detect all in vitro transcribed RNA controls at low concentrations.

The study demonstrates that diverse CoVs are present in different South African bat species and lends additional support to an ongoing circulation of MERS-related beta-CoVs in this region. The observed cases of coinfection indicate the potential for recombination that could lead to the emergence of a new CoV that might have zoonotic potential. The use of lineage-specific primers as a screening PCR approach yielded significantly more positive samples. The assessment of published screening assays revealed that a standardised approach to screening bat samples for CoVs is currently lacking and that due to their genetic diversity, a single primer set-based screening assay likely underreports on more diverse CoVs or CoVs present at low titres. These findings could assist the development of improved wildlife surveillance sampling strategies for better detection of novel bat CoVs.

Keywords: coronaviruses, emerging infectious diseases, virus surveillance, ecology

This research was supported by the German Research Foundation (DFG), Harry Crossley, National Health Laboratory Service Research Trust, National Research Foundation (National Research Foundation), Poliomyelitis Research Foundation (PRF).

Relationship between functional mobility and lower extremity muscle strength in adults with cerebral palsy; 30 years post orthopaedic interventions

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Background: Individuals with cerebral palsy (CP) are prone to experience life-long limitations in mobility. Maintaining locomotion/mobility is however crucial for individuals' independence when aging. To improve and/or maintain locomotion, orthopaedic interventions are commonly performed during childhood. Studies have shown that functional mobility related to muscle strength in children with CP. It is however unknown what the level of functional mobility is in adults with CP who received an orthopaedic intervention during childhood, and whether the relationship between functional mobility and strength continues to exist when they grow into adulthood.
Objective: To investigate the relationship between functional mobility and lower extremity muscle strength in adults with CP long-term after their initial orthopaedic intervention.
Methods: Adults with CP and spastic diplegia who received their initial orthopaedic intervention 30 years ago and were able to walk with or without assistive devices (Gross Motor Function Classification System, GMFCS level I-III) were included. The Functional Mobility Scale (FMS) was used to classify subjects' level of mobility for three different distances, 5m, 50, and 500m taken into account the use of an assistive device. Lower limb muscle strength was assessed using hand held dynamometry (HHD) and normalized to bodyweight.
Results: Twenty-eight adults with CP (age/gender) were included in the study. The majority of subjects was able to walk 5m (87%), 50m (64%) and 500m (63%) independently. Negative associations between FMS and lower limb muscle strength

were observed.
Discussion: Results showed that in adults with CP who received orthopaedic interventions more than 30 years ago reduced lower limb muscle strength was related to more limitations in functional mobility. Clinicians are therefore suggested to focus on strength training of lower extremities in adults with CP. These long-term outcomes may help individuals with CP and their families in setting realistic expectations and support clinicians in optimizing interventions.

Field of research: health/rehabilitation

Designing appropriate in vitro models for skeletal muscle regenerative strategies; Opportunities and arguments for multidisciplinary research as a Postdoc

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Skeletal muscle injury and degeneration due to trauma, disease or aging have a significant impact on quality of life. Subsequent limitations on mobility can lead to a downward spiral with increasing morbidity and mortality, motivating for the development of regenerative medicine interventions aimed specifically at restoring muscle. Research on muscle regeneration has been historically carried out in 'the usual suspects': simple cell culture systems, animal models, and human volunteers. However, in recent years more sophisticated in vitro models have started to be developed to escape the limitations of these platforms. Skeletal muscle is a deceptively complex tissue, and its study should ideally use an interdisciplinary approach by its nature: physiology, cell biology and metabolism. A solid foundation in all of these fields with accompanying specific expertise is usually established during the period of PhD training and research. However, to design in vitro models of skeletal muscle regeneration demands more: multidisciplinary collaboration between experts from a number of even more complex specialisations such as immunology, stem cell science, electrical and mechanical biophysics and polymer science. The postdoctoral period is an ideal time to join with other experts in multidisciplinary projects to add depth and novelty to one's field of research and such opportunities should be sought out and embraced.

Field of research: tissue engineering

Securing rural land rights as a means to an end, the insecurities of the South African communal land tenure system

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There are numerous ways of acquiring land tenure security. As such, the goal of any formalisation programme is to reduce poverty of the vulnerable through safeguarding their rights or interests in land. There have been fierce debates in the past on how this can be attained. In this light, various methods have been advanced by the World Bank over the years: However futile its efforts have proved to be, there are a number of formalizing techniques that the World Bank has recommended in an effort to secure land rights. These approaches have changed over the years and will continue to change because no one technique will be a one-size-fits-all, more so, in light of the distinct nature of land rights from community to community. It is for this same reason that communal land tenure has proved to be especially difficult to secure: In a rural community that administers its land communally, members therein hold and use land as a collective and have no unilateral claims over it.
In terms of the World Bank's initiatives, around the 1980's, the policy debate focused on the individualisation of tenure (titling) which promoted economic development. Compared with their insecure land rights counterparts, secure ones are believed to increase credit use and facilitate land transfers among other reasons. However, by the late 1990s, the World Bank analysts concurred that formal individual land titling may not have been the most desirable way to secure land rights. Thus, the 2013 World Bank position has veered from the original standpoints by endorsing legal pluralism and advocating for a leading role for Africa's customary authorities and practices in the

governance of land. Therefore, this paper aims to show that it is absurd to impose a one-size-fits-all method of securing land rights in a system that has different types of landholding. In a nutshell, an effective land formalization system should accommodate the specific needs of the people. This paper will suggest alternative means to secure the currently "informal" South African communal land rights.

Field of research: south african property (land) law

Towards the proactive management of employee wellbeing: culture, policies and practices as the drivers and enablers.

Rose Mathafena

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Employee wellbeing is exceedingly becoming a prominent and strategic agenda for organisations due to its associations with employee outcomes such as performance, productivity, retention and work attendance. Studies in both occupational health psychology and behavioral sciences have been giving a specific focus on workplace wellbeing in the physical, emotional and psychological domains (Avey, Luthans, Smith, & Palmer 2010). The increase of spending on the investments such as health care schemes, corporate wellness programmes and employee assistance programmes has been growing in popularity in most organisations. The derived benefits for the investment in the collective employee wellbeing are among others the gaining of competitiveness in terms of provision of employee value proposition and also the establishment of the employer brand in the talent market. Kossek, Kalliath and Kalliath (2012) asserts that wellness programmes are beneficial when correctly implemented.

The purpose of the research is to explore the significant role that the organisational culture and climate, the operating business practices, and also the applied policies can have on improving the overall organisational state of wellbeing.

Given the importance of employee wellbeing to business functioning and effectiveness the research project aims to address the following research questions, namely: (i)What type of organisational culture and climate is conducive for progressing wellbeing? (ii)What elements can be incorporated into the policies that are supportive of wellbeing ? (iii)What are the

commendable wellbeing best practices that can be adopted by organisations to improve the state of employee wellbeing?. The literature analysis conducted by Avey, Luthans, Smith & Palmer (2010) indicates that positive organisational behaviors such as employee upliftment , betterment and creation of positive work environments seemingly improve employee wellbeing. Employee wellness constitutes a way of life and culture as opposed to a programme, activity or an intervention (Kossek, Kalliath & Kalliath, 2012) . In order to further the cause of wellbeing in organisations, Human Resources and the Wellness Practitioners need to transition and advance the approaches to wellbeing management from being activity based towards a more systematic and also an integrated approach.. The proactive management of employee wellbeing is imperative more specifically when efforts are directed at changing the impactful drivers such as culture, climate , practices and also policies. The study does not intent to underscore the current approaches to wellbeing which focus on prevention strategies, education, awareness and treatments but rather to build upon and enhance the foundational work accomplished.

Field of research: organisational behavior : employee wellbeing

Job Insecurity in South Africa's Higher Education

Lara Christina Roll

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'Academics "face higher mental health risk" than other professions', a headline shared thousands of times on social media outlets such as Facebook and Twitter. The report claimed that about 37 percent of academics have mental health disorders, a higher level than found in most other occupational groups. A major contributing factor was job insecurity.

It is the perception of lack of security that is more relevant to well-being than actual threat to employment. The uncertainty of whether the job will be lost creates stress, because the individual does not know what will happen and cannot move on. Job insecurity has consistently been linked to negative health and performance outcomes.

To deal with their job demands, employees can self-initiate changes to improve the fit of their job characteristics and their own needs, a process known as job crafting. We expect that when employees face job insecurity and they use job crafting, loss of job satisfaction could be diminished.

Hypothesis

We anticipate that job insecurity will be negatively related to employees' job satisfaction and in-role as well as extra-role job performance through job crafting.

Methodology

Online data collection at three traditional universities and three universities of technology in South Africa was completed in June 2018 and yielded 1500 responses. Questionnaires were conducted in English and distributed via internal staff emails and advertisements on university platforms. Analysis on the data set has just commenced and we expect to find results in line with our hypothesis. Final results will be presented during

this talk.
Implications
Job insecurity severely impacts employee performance and well-being. In the case of universities, there is a high risk that students and their education will be negatively affected if staff members suffer from job insecurity. It is mandatory to address job insecurity in higher education to strengthen universities and provide higher quality education for the next young generations of South Africa.

Field of research: work and organizational psychology

The postgraduate journey: An explorative study on the experiences and narratives of postgraduate students and supervisors at a South-African University

Laura Weiss

North-West University, Optentia

Postgraduate students (master and PhD students; PGs) are extremely important for South Africa's economy. They are indispensable for realizing the country's aim to develop into a knowledge-based economy. Helping them to succeed would be an effective way to create more income for the struggling universities via subsidies for PG's graduation and research output. However, student drop-out rates in SA belong to the highest in the world.

Part of the problem is the effect a postgraduates study can have on their mental health. 40% of PhD students suffer from depression. But even PGs that do not suffer from mental illness are often languishing, feeling isolated and incompetent. Helping them to cope with stress, experience meaning, explore talents and connect could improve their well-being, which impacts academic achievement: flourishing students perform better.

I will present my post-doctoral research project, which aims to support postgraduate students to flourish and perform optimally. Firstly, I will present the findings of a systematic literature review and based on that, introduce a theoretical framework with the concepts important for postgraduate well-being and performance: By using study resources (e.g. supervisor support) and personal resources (e.g. resilience), student's motivation increases and they can deal effectively with the high study demands (e.g. pressure), improving flourishing and academic performance.

Secondly, I will present preliminary findings of an interview study amongst PGs and their supervisors, conducted at a South African University. I will present how they experience their postgraduate journey, the challenges they face (e.g. getting ethics approval, loneliness) and the things that help them most in coping with the stresses of their study. Their well-being often deteriorates in the course of their study. However, they often find helpful strategies. We found that students make use of both personal resources (e.g. resilience) and study resources (e.g. an engaged supervisor). We will share the tips they have for other students, supervisors and universities.

Field of research: positive psychology

Cross Border Education and its Influence on the Quality of Higher Education

Peter Neema-Abooki

University of Johannesburg

The rapid growth of Cross-Border academic programmes in higher education has prompted institutions to develop processes and implement strategies to ensure the quality of their offerings. Although there is no one-size-fits-all approach, there are quality standards that institutions can effectively implement regardless of context. This paper examines the influence of cross-border education on the quality of higher education. Specifically, this paper provides a background and overview of quality assurance in cross border higher education and definition of terms before delving into the rationale for cross border higher education and how the awarded qualifications is acknowledged beyond the awarding institutions. The benefits of and the threats to cross border higher education are then presented together with the challenges. The study adopted a descriptive research design using documentary analysis method. Revealed that owing to the differences in scope, size, location, mission, and extent, there is inconsistency in the institutions' strategies to addressing quality assurance in cross border higher education. However, initiatives such as integration of research, the use of English as a language for scientific communication, the growing international labor market for scholars and scientific, the growth of communication firms and of multi-national, technological publishing as well as the use of information technology among others have been put in place as part of cross border higher education. The study recommends a triad of key challenges that institutions of higher learning must address in a bid to cope with the imperatives of cross-border higher education.

Keywords: quality assurance, quality education, cross-border higher education

'We must stop talking about rights, instead talk about responsibilities...': Perceptions of urban high school teachers on children's rights in Johannesburg, South Africa

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Children's rights are a current topic of discussion globally and South Africa has come a long way in advancing children's rights notably after the attainment of democracy in 1994. This paper explores perceptions of 40 South African high school teachers (17 males and 23 females) on children's rights. Data were gathered through an open-ended qualitative questionnaire which was self-administered to teachers and analysed thematically. Findings showed both positive and negative perceptions. While 45% of the teachers perceived that it was important to teach children about their rights, about 47.5% believed they were causing problems. In light of this, we recommend the need for more training of teachers on children's rights, aimed at increasing awareness and transforming their perceptions of children's rights.

Keywords: children's rights, responsibilities, perceptions, planned behaviour theory, teachers, Johannesburg

This research was supported by the South African Research Chairs Initiative of the Department of Science and Technology and National Research Foundation of South Africa

An exploration of the school feeding scheme in disadvantaged primary schools in South Africa

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Discourses on the school feeding scheme in South Africa are varied, ranging from its conceptualisation, importance, management and ability to meet the needs of learners as well as fulfil its broader objectives of improving learner retention and performance. Although the relevance and impact of the school feeding scheme are undeniable, its sustainability is questionable; thus, necessitating further exploration of its management and implications within individual school contexts. While there are pros and cons regarding its existence, there is a need for deeper understandings of the management processes in place, the level of success and challenges inherent within individual school contexts.

This paper thus sharply focuses on three disadvantaged primary schools in an informal settlement in Cape Town, to explore the school feeding scheme. It uses data from observations, individual interviews and focus group discussions with the participation of 60 grade 7 learners, 12 grade 7 teachers, and 3 principals. The paper uses asset-based and capability approaches as lenses to explore the management and implications of the school feeding scheme in the selected primary schools. Findings reveal that the school feeding scheme is inadequately managed in the selected schools due to a multitude of challenges, including the lack of coordination and communication.

Findings, therefore, indicate the need for coordinated efforts, improved communication and the capacitation of stakeholders with skills that will enable them to manage the school feeding

scheme effectively to ensure better outcomes. The argument presented here is that when the stakeholders involved are able to collaborate and see themselves as part of the whole, with one overarching objective, the school feeding scheme will be adequately managed to allow for the realisation of its objectives. The paper therefore recommends the implementation of monitoring and evaluation mechanisms at school and circuit levels to ensure functionality of the school feeding scheme for maximum impact. The following questions are explored in this paper: (i) to what extent has the school feeding scheme lived up to its expectations? (ii) What are some of the contextual challenges facing the school feeding scheme? and (iii) how can the school feeding scheme be made more responsive and purpose oriented?

Keywords: school feeding scheme, disadvantaged schools, asset-based, capability approach

This research was supported by SANRAL Chair and Deans Office, Faculty of Education, University of the Free State

Peer group and parenting styles influencing teenagers' deviant behaviour in secondary schools

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Deviant behaviour is an act of indiscipline or behaviour disorder which served as a major source of different social vices in the Nigerian society. This study, therefore, investigated the influence of peer group and parenting styles on teenagers' deviant behaviour in selected secondary schools. Seven hypotheses guided the study. A survey research design was adopted for the study and the population consisted of all secondary school students in Ado-Ekiti, Nigeria. Simple random sampling technique was used for the selection of five secondary schools where 150 respondents were drawn. Test-retest method was used for estimating the reliability of the instrument with a reliability coefficient of 0.75. The data collected were analysed using descriptive. The hypotheses were tested at 0.05 level of significance using ANOVA, Multiple Regression and t-test. The results revealed that the peer group has a significant influence on teenagers' deviant behaviour (tcal. = 13.089, P<.05). The result also indicated that parenting styles (paired samples) have a significant influence on deviant behaviour (tcal. = 33.551, P<.05). The result also revealed that peer group and parenting styles have a significant influence on teenagers' deviant behaviour showing (F2,147 =60.537, P<0.05 and t=3.741). The result also revealed that sex has no significant influence on deviant behaviour (tcal=1.155, P<.05). It was indicated that age has a significant influence on teenagers deviant behaviour exhibited (Fcal.5.724, P<.05). The result revealed that religion has no significant influence on teenagers deviant behaviour exhibited (tcal. = 0.342, P>.05). Finally, class level has a significant influence on teenagers' deviant behaviour exhibited.

(Fcal. 3.880, P<.05). Based on the findings of this study, it was concluded that peer group and parenting styles are important factors in predicting teenagers' deviant behaviour. It was recommended that teachers should identify the peer group and parenting styles of students with deviant behaviours in schools.

Keywords: teenager, peer group, parenting styles, deviant behaviour

School-based Cybersecurity Education Programme for Schoolchildren in South Africa! A Timely Call from Bloemfontein

Olugbenga Ige

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The improvement in Internet connectivity has interconnect different countries of the world like nothing before. The improved Internet connectivity has been attended with diverse security risks such as bullying, scamming, hate speech, and identity theft especially for minors. It is unfortunate that the security risks attached to the use of the Internet are often ignored in the rush to log online by schoolchildren in South Africa. The cyber insecurity in South Africa is made more precarious as schools do not teach cybersecurity as a subject in South Africa at present. Consequently, it behooves the researcher to propose a blue-print on developing a school-based cybersecurity education programme for South African schoolchildren.
The researcher adopts the community-driven model to design the school-based cybersecurity educational programme. This discourse illustrates how teachers can use the informal cybersecurity educational programme to teach cybersecurity in South African schools.

Keywords: school-based cybersecurity education, programme, schoolchildren, south africa, timely call, bloemfontein

Transitioning between reforms: Physical sciences teachers' perspectives on the practical component of CAPS

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University of the Free State, Faculty of Education

This article reports on a broader study that explored physical sciences teachers' perceptions about physical sciences practical components during the transition from the National Curriculum Statement (NCS) to the Curriculum Assessment and Policy Statements (CAPS) in South Africa. Teachers often face challenges in adjusting to new reforms. Oftentimes reforms fall behind the scheduled timeframes as envisaged by policymaker. Teachers' perceptions about the reforms are critical in determining the success or failure of the reforms. It becomes critical to probe these perceptions during periods of curriculum transitions. Through this qualitative case study, we conducted open-ended semi-structured interviews with seven teachers from different schools. All participants appeared more concerned about challenges experienced during the previous National Curriculum Statement curriculum (NCS) such as time constraints, insufficient content knowledge, insufficient practical skills and heavy workloads. Surprisingly, participants were satisfied at the overly restrictive prescriptiveness of practical experiments components. Participants were less concerned about an enquiry approach to experimental activities, option for recipe-like teacher led activities. Accountability measures, such as the emphasis on high stakes test results constrain teachers' practices and judgements towards good teaching. This article reports on a broader study that explored physical sciences teachers' perceptions about physical sciences practical components during the transition from the National Curriculum Statement (NCS) to the Curriculum Assessment and Policy Statements (CAPS) in South Africa. Teachers often face

challenges in adjusting to new reforms. Oftentimes reforms fall behind the scheduled timeframes as envisaged by policy-maker. Teachers' perceptions about the reforms are critical in determining the success or failure of the reforms. It becomes critical to probe these perceptions during periods of curriculum transitions. Through this qualitative case study, we conducted open-ended semi-structured interviews with seven teachers from different schools. All participants appeared more concerned about challenges experienced during the previous National Curriculum Statement curriculum (NCS) such as time constraints, insufficient content knowledge, insufficient practical skills and heavy workloads. Surprisingly, participants were satisfied at the overly restrictive prescriptiveness of practical experiments components. Participants were less concerned about an enquiry approach to experimental activities, option for recipe-like teacher led activities. Accountability measures, such as the emphasis on high stakes test results constrain teachers' practices and judgements towards good teaching.

Keywords: curriculum implementation; Curriculum Assessment and Policy Statements; CAPS; perceptions; physical sciences

Signals of positive selection in immune response genes of an admixed southern African population

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The recent availability of exome sequence data and improved statistical analyses has facilitated investigations into the extent of selective pressure due to pathogens in numerous human populations. However, there have been very few studies investigating this in southern African populations where it is hypothesised that the selective pressure due to tuberculosis and smallpox was vast. Here, we perform a post-admixture positive selection scan using the population branch statistic, to identify signals of selection associated with immune response in the highly admixed South African Coloured (SAC) population. Using ancestral populations from the 1000 Genomes Project for comparison, we found SAC-specific signals of selection in HLA-DRB5 and CYP4F12, amongst other genes. This study not only supports the hypothesis that natural selection plays an important role in shaping human immunity, it highlights particular pathways associated with immune response that could be investigated further, particularly with respect to tuberculosis susceptibility in southern Africa.

Keywords: positive selection, immune response, smallpox, tuberculosis, southern africa

This research was supported by the National Research Foundation, South African Medical Research Council

A cluster for an iron-sulphur cluster synthesis regulator

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Iron-sulphur clusters (Fe-S) are cofactors utilised by proteins involved in several important cellular processes. Mycobacterium tuberculosis (Mtb) has one Fe-S cluster synthesis system. Fe-S cluster synthesis must be tightly regulated due to the toxicity of Fe-S clusters. In cyanobacteria, SufR is a transcriptional repressor of the Fe-S cluster synthesis system. SufR coordinates an Fe-S cluster via three conserved cysteine residues, and binding of an Fe-S cluster to SufR changes its affinity for DNA, thereby allowing adaptation of gene expression based on Fe-S cluster availability. In this study, we investigated the ability of Rv1460, a SufR homologue, to coordinate an Fe-S cluster and study the importance of three conserved cysteine residues for Rv1460's function.

Recombinant Rv1460 protein was produced and purified, and reconstitution of the Fe-S cluster performed by enzymatic and chemical methods. The reconstitution reactions were monitored by circular dichroism (CD). Three cysteine conserved residues were mutated, individually and in combination, to serine residues and the ability of these variants to complement a Rv1460 M. tuberculosis mutant was tested. A promoter reporter assay was used to determine the ability of the Rv1460 serine variants to repress transcription relative to the wild-type repressor.

The CD spectrum of Rv1460 reconstitution reactions showed peaks at 330 and 420 nm, characteristic of the formation of a 2Fe-2S cluster on Rv1460. Serine variants were less efficient at complementing the Rv1460 mutant, indicating that these residues are required for Rv1460's function, presumably through affecting Fe-S cluster coordination. Mutation of the

conserved cysteine residues did not reduce the ability of Rv1460 to repress transcription from the Rv1460 promoter. The role of the Fe-S cluster in the binding of Rv1460 to DNA therefore needs further investigation.

Field of research: molecular biology, tuberculosis

Quinolone-hiosemicarzones/hydrazone: Synthesis and anti-TB evaluation

Richard Mbi Beteck

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Tuberculosis (TB) is an infectious disease of high burden to Africa as whole and South Africa in particular. Although much about the biology of the causal agent and the pathogenicity of the disease have been known for over a hundred years, treatment of this disease has been challenged several times due to emergence of parasitic strains resistant to mainstay antibiotics. With increasing prevalence of totally drug resistant form of TB, the current situation is an unprecedented crisis that necessitate the exploitation of new strategies in drug discovery.

Our approach to counter resistance while minimizing side effects and compliance, is to conceptualize and synthesize novel small organic molecules incorporating at least two distinct chemical motifs that can concurrently interact with different key targets in the parasite. It is important to note that compounds containing thiosemicarbazones/hydrazones can chelate iron, an essential nutrient required by most microbes and parasites to initiate infection and multiplication. Also, quinolone containing compounds have been reported to exhibit their antimicrobial properties by inhibiting DNA gyrase and Topoisomerase IV. We thus synthesised a series of quinolone-thiosemicarzones, and quinolone-hydrazones, characterized them using spectroscopic techniques and subsequently evaluated them for cell toxicity and anti-TB potential, respectively. While the compounds showed little to no cell toxicity, they were all active against TB parasite, with most of the compounds exhibiting an activity profile superior to that reported for fluoroquinones, and on par with isoniazid. The structure activity profile of this series is a useful resource for further development of more

potent anti-TB agents.

Field of research: chemistry/drug discovery

Novel Anti-proliferative Activities of Folate-decorated Endostatin-loaded Nanoparticulate System in Oesophageal Squamous Cell Carcinoma

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Smart nanosystems designed to specifically deliver cancer therapeutics and facilitate optimal dosage form at disease sites with potent anti-proliferative effects is the paradigm shift in anti-angiogenic research. Endostatin (ENT), as an endogenous inhibitor of angiogenesis targeting tumor vasculature, has been clinically proven to be promising as an anti-cancer drug. Folate receptors, as unique molecular signatures, are overexpressed on the cellular membrane of different tumor cells including Oesophageal Squamous Cell Carcinoma (OSCC). In this study, we employed folic acid (FA), as a driver for direct targeting of ENT-loaded nanoparticles in OSCC management. Spherical nanoparticles, with positively charged surfaces, were synthesized with selective pH response for ENT release in vitro. Our results confirmed successful internalization of folate-decorated nanoparticles into OSCC cells with preferential binging to the nucleus and the mitochondrial for necrotic and apoptotic effects. Moreover, FA-linked ENT-loaded nanoparticles showed increased proliferation inhibition of 64.71% and reduced KYSE-30 cells migration up to 74.12% in vitro when compared to the control. Treatments increased the extent of tumour necrosis in tumours of mice that received FA-functionalized nanosystem relative to the native ENT treated tumour. In summary, our findings demonstrate the potential use of FA-decorated nanoparticles as delivery vectors for active transport of ENT into tumour cells with an enhanced in vitro

and in vivo anti-proliferative efficacy in OSCC management.

Keywords: angiogenesis, endostatin, folate receptors, folic acid, nanoparticles, cell migration, proliferation, necrosis

Identification of a novel pathogenic BRCA2 mutation (c.5159C>A, S1720*) and several variants of uncertain significance in Kenyan breast cancer patients

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Background: The prevalence of mutations in the BRCA1 and BRCA2 genes is increased in people with a family history of cancer. The genetic contribution to the breast cancer burden in Africa, where breast cancer is characterized by early onset and high mortality, remains uncertain. The cumulative risk for breast cancer by the age of 70 years is between 40% to 87% for BRCA1, and 27% to 84% for BRCA2 carriers. However, to our knowledge detection of BRCA 1 /2 mutations has not previously been described in the Kenyan population.

Objective: To determine the prevalence of mutations in the BRCA1 and BRCA2 genes in Kenyan breast cancer patients selected for this study based on tumour pathology and family history.

Methods: A total of 96 (94 women and 2 men) histologically

confirmed breast cancer patients were consecutively enrolled in the study after signing the inform consent form (Ethics approval number 000655). DNA extracted from saliva samples of 13 patients (aged 35-70 years) with self-reported family history, were analyzed using whole exome sequencing (WES) on the Ion Proton. WES reads were mapped to the GRCh37 human reference genome and variants called with Torrent Suite. The BRCA1/2 genes were prioritized for variant classification. Results: A novel pathogenic BRCA2 nonsense variant (c.5159C>A; S1720*) in exon 11 was discovered in a Kenyan patient with a family history of both breast and colon cancer. Seven (1 BRCA1; 6 BRCA2) variants of uncertain significance (VUS) were also detected. BRCA2 missense variants were identified in exon 11 (c.5198C>T, S1733F, c.4090A>C I1364L, S1733F), exon 15 (c.1525A>G, S509G), exon 16 (c.7676C>G, S2559C), exon 27 (c.9691T>C, S3231P) and in the 5'UTR (c.-11C>). A BRCA1 3'UTR variant was identified at c.*36C>G in two patients.
Conclusions: BRCA2 S1720* results in a truncated protein and is therefore classified as pathogenic. Detection of the pathogenic BRCA1/2 gene mutation (1/13, 10%) uncovered by WES confirmed that family history is an important indicator for BRCA1/2 mutation screening in Kenyan breast cancer patients. The mutation frequency pattern may change when more data becomes available on the BRCA1/2 mutation spectrum in Africa.

Keywords: keywords: breast cancer, brca1/2, novel mutation, wes, kenya, africa

This study was supported by the Strategic Health Innovation Partnerships Unit of the South African Medical Research Council, with funds received from the South African Department of Science and Technology (Research grant number S003665). DNA Genotek Inc. and Walther grant sponsored saliva kits used in this study as part of the informed consent process.

Synthetic High Mobility Group Box 1 inhibitors arrests cell cycle in colorectal cancer cells

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Introduction: Despite being significant advances in colorectal cancer (CRC) treatments, recurrence and chemoresistance remain a challenge in the treatment of patients. During the process of autophagy, cancer cells acquire anoikis resistance and escape chemotherapy. High Mobility Group Box 1 (HMGB1) molecule is a key mediator of autophagy and can be exploited to develop effective targeted anticancer therapies. Gabexate mesilate (GM) used in the treatment of pancreatitis, is both a synthetic inhibitor of HMGB1 and of metastasis. Structural analogues of GM hold promise to suppress HMGB1 functionality to arrest cancer growth, recurrence and resistance mechanisms. Methods. A total of thirteen GM mimetics were synthesized and their anticancer activity was performed against SW480, HT29 and DLD1 colorectal adenocarcinoma cells. Anticancer activity was determined in terms of IC80 using alamar blue screening and trypan blue exclusion assays, while cell cycle analysis was performed using a propidium-iodide based staining assay in a Muse-flow cell analyzer. Docking studies were further performed to predict the binding modes and affinity of active GMM for HMGB1.

Results: Novel synthetic GM mimetics A1-A3 and A6 were found most active with an anticancer IC80 of 250-500μg/ml, however A4, A5 and A7 showed moderate anticancer activity

(IC80 500-750μg/ml) and mimetics A8 and A9 showed weak anticancer activity (1000-1500μg/ml) against SW480, HT29 and DLD1. Treatment with active GMM's resulted in CRC cells being arrested mainly in preparatory phases, G1/G0 and G2/M. Molecular docking studies established that the active GMMs possessed specific binding affinity with the target, compared to the inactive GMM.

Keywords: high mobility group box 1, gabexate mesilate, molecular docking, colorectal cancer, cell cycle, synthetic analogues

This research was supported by Medical Research Council (MRC), National Research Foundation (National Research Foundation), Wits Faculty of Health Sciences Griffin Trust Fund

Electrical Characterization of Tungsten-doped Gallium Antimonide Schottky Barrier Diodes

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Sefako Makgatho Health Sciences University, Physics

When designing electronic devices for operation in a radiation environment, it is essential to know the effect of radiation on their characteristics. Gallium antimonide (GaSb) semiconductor materials have been commonly used for high-energy radiation detectors, solar cells, microelectronics and photodiodes. Detectors fabricated on this material had some difficulties when operating in high radiation environments. The purpose of this study is to investigate the electrical characteristics of aluminium diodes fabricated on doped GaSb material. An n-type Te-doped GaSb semiconductor material with a free carrier concentration of 2.0 × 1017 /cm3 was used. Single charged tungsten ions (W+) were implanted into GaSb samples at the fluencies of 2.0 × 1015 ions/cm2, 4.0 × 1015 ions/cm2 and 6.0 × 1015 ions/cm2 at the energy of 60 keV. Au/Ge/Ni ohmic contacts was deposited on the back side of n-GaSb wafers by electron beam deposition system, followed by annealing at 350 oC for 5 min in nitrogen atmosphere. The Schottky contacts were also formed by evaporation of aluminum (Al) metal as dots with a diameter of 0.7 mm through stainless steel mask under a vacuum pressure of 7.0 × 10-4 Pa. The fabricated diodes were characterized by current-voltage (I-V) and capacitance-voltage (C-V) measurements at room temperature. The implanted doses were measured by Rutherford backscattering Spectrometry (RBS) technique and found to be of 0.87 × 1015 cm-2 at a depth of 84 nm for the highest fluency. The results showed that the diodes fabricated on n-GaSb semiconductor metal indicated typical diode behaviour with average ideality factor close to unity. The average Schottky barrier

heights were found to decrease with increasing particle flux on n-GaSb semiconductor material. The implanted tungsten ions caused some relaxation in n-GaSb material, which suppressed the effects of radiation on devices based material.

Field of research: semiconductor physics

Multifaceted biomolecules for the advanced nanotechnological applications

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Peptide based photo sensitive conjugates are becoming unique paradigms to unravel the mechanism of complicated process arises during the study of bio(nano)technology. It is well established that the presence of photo sensitive group over peptide based materials can be used to monitor several biological processes. Peptides enriched with photo sensitive amino acids and specific functionality not only useful to prepare and modify the shape of metal nanoparticles but also have potential for creating the unique and unusual self-assembled nanoarchitectures. Here we are demonstrating the unique nanoarchitectures obtained by self-assembling behavior of special class of short peptides-conjugates particularly in the presence of light and metal used as trigger/manipulators, for possible future applications.

Field of research: peptidomimetics

Cashew nut shell liquid and castor oils as valuable bio-resources for the production of chemicals, materials and fuels

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Food waste is currently generated in significant quantities worldwide. Cashew nut shells (CNS), which are agro wastes from cashew nut processing factories, have proven to be among the most versatile bio-based renewable materials in the search for functional materials and chemicals from renewable resources. Food supply chain waste emerged as a resource with a significant potential to be employed as a raw material for the production of fuels and chemicals given the abundant volumes globally generated, its contained diversity of functionalised chemical components and the opportunity to be utilised for higher value applications. Various schemes of strategies and technologies have been established to process and maximize the value of resources derived from these CNS bio-wastes including chemical and biological biorefinery approaches. This derivatization has environmental and economic merits leading to creation of jobs and improved economic growth. CNS and castor oil derived chemical products have been proven to replace fossil resources for the production of chemicals, materials, polymers, energy and fuels. The discovery and application of eco-friendly benign new products and product mixtures that can replace hazardous chemicals are important areas of green chemistry.
In recent years, we have demonstrated the conversion of CNS and castor oil bio-products into value-added chemicals and alternative eco-friendly reagents for various uses; the biochemical-derived products from this agro-waste have showed to equally compete with commercially-available reagents. We have used

CNS chemical products for the preventions of termite attack, tsetse fly traps (Kairomone), starting materials of polymers and as green capping agents for the synthesis of nanomaterials. We have also used castor oil in different applications such as in polymer, biofuels and surfactants for the fabrication of nanomaterials and in both cases, the biochemical derived products showed to equally compete with commercially available reagents. It is noteworthy that CNS and castor oil do not pose food competition threats. Hence, these agro-waste have become one of the earmarked candidates for potential use and/or incorporation in renewable energy, in response to the depletion of fossil-based petroleum reserves attributed to increasing global demand.

Keywords: castor oil, Cashew nut shells, biofuels, green chemistry, nanomaterials

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Hunting for a treasure at the museum: how zoological collections can contribute to epizoic diatom exploration

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Aquatic animals provide unique habitats for various macro- and microorganisms, including many diatoms that cope especially well with challenges posed by rapidly changing conditions related to the host's biology and behaviour. Although exploration of previously undescribed biotic aquatic habitats has yielded many new diatom taxa, some exhibiting traits of obligate epibionts, the epizoic diatom diversity, their biogeography, as well as nature of the close relationships between the host organism and its epibionts remain poorly understood.
This study takes advantage of the unique resource of well-preserved aquatic vertebrate specimens (including whales, sea turtles, freshwater turtles, aquatic snakes, seabirds, sharks, and marine iguanas) provided by several natural history museums. It aims to provide baseline data about epizoic diatoms from both marine and freshwater habitats, generating a significant advance in epibiotic diatom research and minimizing the cost and any possible environmental footprint of a similarly extensive study involving fieldwork and fresh material collection. The analysis of 101 samples of both dried and liquid-preserved specimens collected from locations across the different ocean basins proved that zoological museum collections may indeed constitute an excellent source of unique and often very rich epizoic diatom material. However, several important limitations of such study must be considered.

Field of research: marine biology/aquatic botany/phycology

Determining the need for enhanced mobility programmes and therapies [complementary care] in psycho-physically vulnerable populations, including people living with HIV/Aids

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Despite significant advances in ART, there are still negative side-effects which impact on the HIV-positive population (PLWH) and which may cause severe physical and psychological distress. These are a result of both HIV- and ART-associated factors.

Although less prevalent in the new antiretroviral regimens, there remains a high incidence of toxicity-related disorders. These include dyslipidemia and metabolic disorders, such as lipodystrophy which have been found to play a role in causing distorted body-self image in this population. Added to this are inherent psycho-social factors, such as pervasive stigma, and physical disability. This leaves the HIV-infectious individual further at risk of developing mental ill-health, including low self-esteem and depression. Due to these high levels of toxicity and negative side-effects of ART, there is evidence that this population requires programmes and therapies to enhance mobility, quality of life and physical conditioning. Although the study was conducted in 2 stages, this presentation will focus on Stage 2, which was aimed at quantitatively measuring the impact of a physical therapeutic intervention on body self-image and depression in a sample (where n=60, mean age = 39,0; years; mean years on ART=5.5; 86% =African) of HIV-positive women in three primary care clinics in South Africa. This constituted a pre-post-test experimental design, using a) Beck's Depression Inventory and b) the Body Self-image questionnaire which were subjected to the

effects of a dependent variable, namely the therapeutic exercise programme.
Descriptive statistics were tabled for the two screening instruments. A cross-tabulation, to determine the incidence of Lipodystrophy, according to ARV regimen was conducted, where it was found that there was a high absence (89.7%) of metabolic disorders in participants receiving the new (single-dose) regimens, and a low absence (10.3%) of metabolic disorders in participants receiving second-line or regimen 2 ARVs (e.g. Stavudine).
Challenges: This created a challenge to the study as participants were less likely to be affected in terms of body self-image disorders and / or mood disorders, such as depression.
Items of the Body-self Image questionnaire were categorised into cognitive-perceptual (I think my body is fat) and affective-attitudinal domains (e.g. I feel fat). Pre- and post-test outcomes indicated low statistical significance for both depression and body self-image for both the experimental and the control groups, with statistical significance for 3 out of nine items of subscales of the Body Self-image Questionnaire, namely negative affect (NA), social desirability (SD) and Health Fitness Influence (HFE). These outcomes were conclusive of a positive response to the intervention, especially in terms of the items negative affect social desirability and those items relating to fitness and health. Concerns around being fat, or body shape and size were not significant.
Discussion and conclusion:
The outcomes of the study showed that, regardless of ART regimen, complementary care interventions of this nature are crucial for PLWH. The emphasis on items of the BSIQ which include fitness constructs points to a positive attitude towards therapeutic exercise. Another reason for low significance could be attributed to cultural perspectives around exercise, body weight, shape, and the possibility of linguistic questionnaire bias.

Keywords: enhanced mobility, complementary care, hiv/aids, psychophysical, vulnerable populations

Antecedents of "Service Quality", Service Business Innovation Model Performance in Tourism/Hospital sector:A new trend perspective.

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University of the Witwatersrand

The purpose of this study aims to obtain the influence of service quality and service business innovation performances within the regional tourism/hospitality service perspective. Tourism/hospitality is touted as key major contributors to revival of regional economy after a slow upward emerging trend of economic fluctuation. While critical to ensure quality service delivery in all services provided by the hotels, tourists to the holiday resorts need assurance and high expectancy to services provided with to be of high quality, increase business performances and also contribute to GDP regionally. To be recognized on global turf, hospitality industry has to be premised on international standards, high customer service quality and business innovation performances. The service quality which broadly is the difference between customer expectations of service perceived as the delivery of excellence of superior service relative to customer's expectancy. Service quality will be used as a strategic tool in setting up quality standards and service business innovation in tourism/hospitality regionally. Service Business Model Innovation (SBMI) refers to the recreation/redesigning, of business, whereas innovation is more typically seen in the form of new service offering, SBMI results entirely different type of hotels competing not only on value proposition of its offerings, but aligns its prot formula, resources and processes to enhance that value proposition, capture new market segments and alienate competitors and increase customer base. Study interrogates

existing theoretical/empirical SBIM literature, develops sound theoretical framework for examining influence of service quality antecedents as predictor variables on service business innovation model as a mediating construct and business performances, repurchase consumption/re-visiting, destination reputation, and prot realization outcomes, specifically to the unique and complex features of Tourism/ hospitality. The researcher identified southern African countries such as South Africa as new emerging market trends for tourism / hospitality potentials in terms of service innovation and business performances regionally. South Africa shares this tourism/ hospitality attractions among the borderline in southern Africa. Research Philosophy will be both (Positivist Paradigm- Quantitative and epistemology/constructivism- qualitative) thus pragmatism philosophy. Research Design and Sampling design, Questionnaire design and Data Collection Technique, interviews, focus group discussions, participatory observation.

Keywords: service quality, business innovation, model, performance, tourism, hospitality

This research was supported by the National Research Foundation

Prevalenceof clinically relevant bacteria from surface sources of a pediatric burns unit in South Africa

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Contaminated healthcare surfaces and hands of healthcare workers have been identified as reservoirs that can facilitate infection of patients with multidrug-resistant (MDR) bacteria in hospital facilities.The aim of the study was to investigate the occurrence of bacteria from selected environmental surfaces of a pediatric burns unit in South Africa. According to hygienic standard for disinfection in hospitals, swab samples (n=150) were collected from patient fles, doctor's desks and patient dressing trolleys and bath tubs after daily cleaning. Samples were collected from the examination room, general wards, intensive care units and dressing rooms. Bacterial isolates were characterized using the VITEK R 2 compact System. The detection rate of bacteria in general wards was significantly higher than other selected hospital areas of the burns unit, with patient fles being more frequently contaminated. The predominant isolates were Pseudomonas aeruginosa, Enterobacter cloacae, and Klebsiella pneumonia, Achromobacter denitrificans, Pseudomonas stutzeri, Stenotrophomonas maltophila, Sphingomonas paucimobilis, Enterococcus casseliflavus, Staphlococcus haemolyticus, Staphylococcus hominisspp, Staphylococus aureus, Micrococcus luteus and Staphylococcus sciuri. The occurrence of these organisms on intimate surfaces has implications on hand hygiene in healthcare settings where cross-contamination can occur from surfaces to hands of health care workers and eventually to vulnerable patients

Keywords: multidrug-resistant bacteria, pseudomonas aeruginosa, stenotrophomonas maltophila

Pharmacotherapeutic properties of Strelitzia nicolai aril extract containing bilirubin

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The fortuitous discovery of an animal pigment bilirubin found in the plant Strelitzia nicolai has opened an enormous number of questions regarding bilirubin's formation and its ultimate function in the human body. For decades, bilirubin was thought to be a latently lethal metabolite of the haem catabolic pathway. Findings from recent studies suggest that bilirubin at slightly elevated levels could be beneficial. Researchers are now proposing that bilirubin could be favourable for the scavenging of overproduced reactive oxygen species, anti-inflammatory actions and directing effects upon cell signalling. This study aimed to investigate if the seed aril extract of S. nicolai containing bilirubin possesses therapeutic properties. HPLC and ATR was used to confirm the presence of bilirubin in the aril extracts. Subsequently, the antioxidant potential was established using the hydrogen peroxide and nitric oxide scavenging activity. Anti-inflammatory activity was instituted using the COX assay. In vitro anti-bacterial, anti-hypertensive and anti-diabetic assays were also conducted. The activity of the extract as a potent antioxidant was immensely augmented as compared to the bilirubin standard, whereas the bilirubin standard was proven to be an enhanced ACE inhibitor than the aril extract. Both the bilirubin standard and extract did not possess any antibacterial activity. This study reveals new insights into the presence of the only animal pigment found in S. nicolai arils and the potential advantages of bilirubin found in a plant. This study hopes to resuscitate researcher's credence

regarding bilirubin as a toxic compound. Furthermore, this extract containing bilirubin might be a good candidate for the therapeutic intervention for oxidative stress related diseases.

Field of research: biomedical science

The immunological effect of plasma derived exosomes from pre-eclamptic women on human placental bewo cells under hypoxic conditions

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University of Kwazulu-Natal, Human Physiology

Objectives: Pregnancy-associated hypertension (pre-eclampsia) can lead to severe complications for both mother and fetus, as pre-eclampsia is associated with placental hypoxia, dysfunction and may exhibit differential as well as specific exosome release profiles that may play a role in immune modulation. The aim of this study was to isolate and characterize plasma derived exosomes from pre-eclamptic (early and late onset) and normotensive ($\leq$ 33 weeks and $\geq$ 34 weeks) women, and investigate whether these exosomes influence cytokine (IL-8; IL-10 and leptin) levels in human placental BeWo cells under hypoxic exposure. Method: This study was institutional approved by the Biomedical Research Ethics Committee of University of Kwazulu-Natal. BeWo cells were plated in twenty-four well plates and treated for 24 hours with cobalt chloride (CoCl2), a chemical hypoxia-inducing agent. Following, co-incubation with characterized and quantified exosomes (100 μg/mL exosomal protein per pregnant group) for 24 hours, IL-8; IL-10 and leptin levels were determined using commercially available immunoassay kits. BeWo cells treated with exosomes under non-hypoxic conditions was used as a control. Results: Hypoxic placental BeWo cells treated with exosomes isolated from $\leq$ 33 weeks normotensive; $\geq$ 34 weeks normotensive; early and late onset women showed significantly increased IL-8 (pro-inflammatory) levels compared to the non-hypoxic control groups subjected to the same exosomal treatments (IL-8:

21. 26 vs 18.56; 38.37 vs 15.97; 44.16 vs 43.90; 55.12 vs 44.16 pg/mL respectively). Leptin levels increased significantly in the experimental compared to the control. Conversely, IL-10 (anti-inflammatory) levels were decreased in hypoxic BeWo cells treated with exosomes compared to the non-hypoxic control groups. Conclusion: In this study, plasma derived exosomes from pre-eclamptic and normotensive pregnancies have differential immunological effects under hypoxic conditions.

Field of research: biomedical science

Investigating the potential bioprotective effects of diosgenin in high glucose induced stressed HEK 293 cells

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Hyperglycaemia is a major cause for microvascular impediments of diabetes. It is also a crucial factor in the development of diabetic nephropathy because of its impact on cells (e.g. glomerular and mesangial), and is considered a serious common complication leading to end stage renal disease. Therefore, there is still a need for continuing research and development of new treatment regimens for diabetes and its complications. For instance, diosgenin is a naturally occurring steroidal saponin present in a variety of plants including, fenugreek (Trigonella foenum graecum) and wild yam (Dioscorea villosa), and its therapeutic properties (i.e. antidiabetic, antioxidative, anti-cancer, etc.) is well-established. Hence, this in vitro study was designed to evaluate the bioprotective effects of diosgenin against glucose-induced stress in human embryonic kidney (HEK 293) cells. Cells were exposed to high glucose (50 mM) and treatment with varying concentrations of diosgenin (1-50 uM) for 24 hours before cell viability was measured using the MTT proliferation assay. The protective effects was assessed by treating the cells with the same diosgenin concentrations before inducing high glucose stress to measure its antioxidant (protective) effects using DCF-DA (2',7'–dichlorofluorescin diacetate), a florescence dye to detect ROS (reactive oxygen species) and biochemical assays for lipid peroxidation as well as nitric oxide levels. Diosgenin at a high concentration of 50 uM had no cytotoxic effects on the high glucose

stressed HEK 293 cells. Pre-treatment with diosgenin significantly reduced ROS, nitric oxide levels and modulated lipid peroxidation. Findings show that diosgenin may exert protective effects by modulating lipid peroxidation and enhancing the anti-oxidation activity in the HEK 293 cells under stressed conditions. In conclusion, diosgenin showed potential bioprotective effects, implying that it could be a beneficial remedy for the treatment of diabetes and its complications. Thus, in vivo studies will be conducted to further analyse and understand diosgenin mechanistic therapeutic abilities for the treatment and management of diabetes and its complications.

Field of research: diabetes

Exome sequencing approach for combined immunodeficiency identifies a novel mutation in MAP3K14

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Background and aims:
Primary immunodeficiency disorders (PIDs) are inborn errors of immunity that render patients vulnerable to infection with a wide range of microorganisms. Single-gene defects may lead to disease manifestations that range from extremely narrow infectious phenotypes to broad multisystem defects. Here, we present the findings of a patient who presented with combined immunodeficiency, disseminated BCG-osis and paradoxically elevated lymphocytes.
Methods:
Whole exome sequencing was performed, and all candidate variants were validated using Sanger sequencing. In-house assays were conducted for functional profiling of candidate variants.
Results:
A homozygous variant in *MAP3K14*, $\text{NIK}^{\text{Val345Met}}$, was identified in the index case. $\text{NIK}^{\text{Val345Met}}$ is predicted to be deleterious and pathogenic by two in silico prediction tools, and is situated in a gene crucial for effective functioning of the non-canonical nuclear factor-κB signalling pathway. Functional analysis showed that this mutation significantly affects the

kinase activity of NIK, leading to decreased levels of phosphorylated IKKα, the target of NIK, in $NIK^{Val345Met}$- versus NIK^{WT}-transfected human HEK293T cells. This finding supports previous illustrations of the importance of NIK in human immune responses, and demonstrates the involvement of function-altering mutations in *MAP3K14* in PIDs.
Conclusions:
A genomic approach as for this patient demonstrates the value in diagnosis of unusual PID phenotype in unexpected genes and as a tool for detecting rarer mutations to help guide treatment strategies.

Keywords: whole exome sequencing; primary immunodeficiencies; genomics; immunity

This research was supported by National Research Foundation

Hitchhiking across the oceans: a summary of a 3-year study on sea turtle-associated diatoms

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Aquatic animals, both marine and freshwater, provide unique habitats for various macro- and microorganisms. Although diatoms have long been known to grow on aquatic vertebrates such as birds, whales, and dolphins, only recently have the first studies exploring sea turtle-associated diatoms been conducted and several new diatom taxa, including three new genera, have been described. These new taxa show traits of obligate epibionts, which means they may require a direct contact with their basibionts (i.e. the host organism) to develop and survive. Since their first discovery, sea turtle diatoms have attracted growing attention, partly due to their potential use as indicators of sea turtle behavior and health. Research here may help to bridge various gaps in general understanding of both sea turtle and diatom ecology, evolution, and biogeography. However, at present many aspects of the symbiosis-like relationship between these micro- and macro-organisms remain unaddressed and it is not yet understood what factors influence epizoic diatom composition and abundance, and what ecological role and function they have in marine ecosystems. This poster will summarize the on-going investigations and recent findings in sea turtle diatoms that may open many new avenues for future research into marine epibiosis and related areas of study.

Keywords: diatoms, epibionts, epizoic algae, microflora, sea

turtle

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