

Elizabeth Louise ALLAN, M.Sc. (Rhodes), in Marine Biology.



Thesis: Trophodynamics of the benthic and hyperbenthic communities inhabiting the sub-Antarctic Prince Edward Islands: Stable isotope and fatty acid signatures.

Supervisor: Professor PW Froneman.

Co-supervisor: Dr NB Richoux.

Louise Allan completed a study on the food web dynamics of the benthic organisms in the shallow shelf waters of the Sub-Antarctic Prince Edward Islands using both stable isotope and lipid analyses. The results of her study highlighted the importance of pelagic production in sustaining the benthic community in the vicinity of the islands and provided insight into the response of the island ecosystem to global climate change.

Natasha BEUKES, M.Sc. (Rhodes), in Biochemistry.

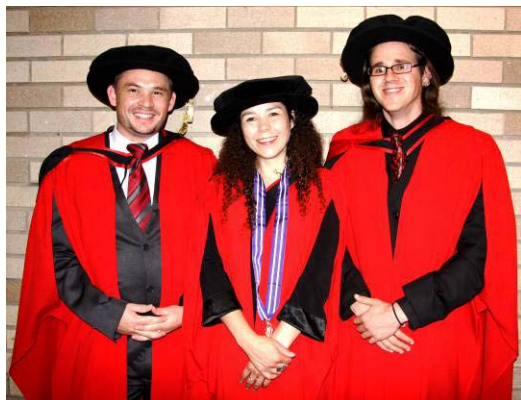


Thesis: Effect of alkaline pre-treatment on the synergistic enzymatic hydrolysis of sugarcane (*Saccharum officinarum*) bagasse by *Clostridium cellulovorans* XynA, ManA and ArfA.

Supervisor: Professor BI Pletschke.

Throughout the world, researchers in second generation biofuel technology are investigating new ways of producing biofuel efficiently without competing with food crops or threatening biodiversity. Ms Beukes has successfully enhanced the baseline rate of fermentable sugar production from sugarcane waste by an impressive 13-fold via the efficient and synergistic combination of three *Clostridium cellulovorans* hemicellulase enzymes, making the production of biofuels more economically viable.

Rory Dennis BRIMECOMBE, M.Sc. (Rhodes), in Biotechnology.



Thesis: Nanomaterial modified electrodes: Optimization of voltammetric sensors for pharmaceutical and industrial application.

Supervisor: Professor J Limson.

Sensitivity and stability are core criteria in the global sensor industry for diseases and pollutants. In a study described as a meticulous, Rory Brimecombe showed how cost-effective treatments of nanomaterials could achieve these goals. After this important contribution to the field of nanomaterials based sensors, he went on to design the first electrochemical sensor for the anti-cancer agent wortmannin.

Gareth COOMBS, M.Sc. (Rhodes), in Botany.



Thesis: Ecology and degree of specialization of South African milkweeds with diverse pollination systems.

Supervisor: Dr CI Peter.

Co-supervisor: Mr AP Dold.

Gareth's thesis greatly expands our knowledge of the ecological and evolutionary interactions between milkweeds and the insects that pollinate them. His study allows us to better understand the mechanisms behind the invasion of exotic plant species in South Africa and elsewhere in the world, and helps explain the extreme rarity in some milkweeds such as a carrion fly-pollinated stapeliad.

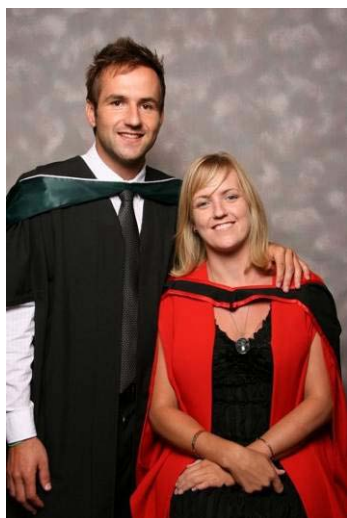
Ronen FOGEL, B.Sc. (Hons) (Rhodes), in Biotechnology.

Thesis: Fundamental investigations into the factors affecting response of laccase-based electrochemical biosensors.

Supervisor: Professor J Limson.

The word "impressive" featured no fewer than six times in the examiner reports for Ronen Fogel's PhD. Uncovering seldom explored phenomena in the field of protein immobilization; he developed a model system for predicting enzyme performance. In applying his findings, he designed possibly the most competitive sensor of its kind for several phenols, compounds which are amongst the most toxic pollutants worldwide.

Jessica Leigh GOBLE, M.Sc. (Rhodes), in Biochemistry.



Thesis: The drugable antimalarial target 1-deoxy-D-xylulose-5-phosphate reductoisomerase: Purification, kinetic characterization, and inhibition studies.

Supervisor: Professor GL Blatch.

Malaria is the worst parasitic disease of humans, affecting 109 countries and resulting in over 1 million deaths per year. Jess used various technologies to identify compounds that could disrupt the life sustaining metabolic pathways of the malaria parasite. Her results have been published in international journals, and have laid a solid foundation for future work on the development of novel anti-malarial drugs.

John Bosco HABARULEMA, M.Sc. (Rhodes), in Physics.



Thesis: A contribution to TEC modelling over Southern Africa using GPS data.

Supervisor: Dr LA McKinnell.

Co-supervisor: Dr BDL Opperman.

Mr Habarulema used the extensive Southern African network of Global Positioning System receivers to provide supplementary ionospheric information over this region. This research has provided a comprehensive guide to the development of models for predicting ionospheric variability over the Southern Africa region, and forms a significant contribution to space weather studies in Africa.

Barry Vivian William IRWIN, M.Sc. (Rhodes), in Computer Science.



Thesis: A framework for the application of network telescope sensors in a global IP network.

Supervisor: Professor G Wells.

Co-supervisor: Dr P Clayton.

The number of threats, such as computer viruses, that spread via computer networks is increasing as use of the Internet grows. Barry Irwin used a network telescope, and related visualisation and analysis tools, that he had developed himself, to detect and monitor the spread of these threats. His thesis provides novel insights into the spread of malicious software, new opportunities for the early detection of network threats, and potential new defence mechanisms.

Helen Margaret JAMES, B.Sc. (Hons) (Rhodes), in Entomology.



Thesis: Systematics, morphology, phylogeny and historical biogeography of the Mayfly family Prosopistomatidae (Ephemeroptera: Insecta) of the World.

Supervisor: Dr FC de Moor.

Co-supervisor: Professor MH Villet.

Mrs James' worldwide study of the mayfly family Prosopistomatidae, is a milestone in our understanding of mayfly evolution. Using novel techniques, 33 new species and two possible monophyletic clades were recognised. One external examiner noted this was one of the most comprehensive dissertations on mayflies that he had reviewed, revealing mayflies to be an excellent group to study biogeography.

Robert Ryan JONES, M.Sc. (Johns Hopkins), in Environmental Science.



Thesis: Risk-based assessment of environmental asbestos contamination in the Northern Cape and North West provinces of South Africa.

Supervisor: Professor C Shackleton.

Co-supervisor: Dr K Whittington-Jones.

Evison KAPANGAZIWIRI, M.Sc. (Rhodes), in Hydrology.

Thesis: Regional application of the Pitman monthly rainfall run-off model in Southern Africa incorporating uncertainty.

Supervisor: Professor DA Hughes.

Hydrological models are frequently used in water resources decision making but are subject to uncertainties in their ability to represent real world situations. This uncertainty has not been previously quantified and could not be accounted for in decision-making. Mr Kapanagaziwiri's thesis has gone a long way towards correcting this situation, by proposing and demonstrating an uncertainty framework for water resource assessments.

Mulualem Tamiru KASSA, M.Sc. (Addis Ababa), in Botany, in the Department of Botany.



Thesis: Molecular analysis of genetic diversity in domesticated Pidgeonpea (*Cajanus cajan* Milsp.) and wild relatives - insights into the domestication of Pidgeonpea.

Supervisor: Professor NP Barker.

Co-supervisors: Professor DR Cook and Professor LGJ van der Maesen.

Pigeonpea is a drought tolerant pulse crop cultivated in the semi-arid tropics in Asia, Africa and Latin America. Despite its wide use, its history of domestication and evolutionary origins were not well understood. Mulualem's research (at Rhodes and in labs in the USA) utilised modern DNA based techniques to resolve these issues and identified DNA markers for disease resistance, plant breeding and crop improvement of Pigeonpea.

Danica MARLIN, M.Sc. (Rhodes), in Entomology.



Thesis: The role of the mite *Orthogalumna terebrantis* in the biological control programme for water hyacinth, *Eichhornia crassipes* in South Africa.

Supervisor: Professor MP Hill.

Co-supervisor: Professor M Byrne.

Water hyacinth remains South Africa's most damaging aquatic weed, and biological control is regarded as the most sustainable control option. Mrs. Marlin investigated the impact of a poorly studied biological control agent, a mite, and concluded that while the mite is an effective agent, eutrophication is the main factor that affects the invasion potential of water hyacinth.

Nicodemus MAUTSA, M.Sc. (Rhodes), in Biochemistry.



Thesis: Structural and functional characterisation of the protein inhibitor of activated STAT3 (PIAS3).

Supervisor: Professor GL Blatch.

Co-supervisors: Dr EA Prinsloo and Dr O Tastan-Bishop.

Cancer kills more people each year than AIDS, tuberculosis and malaria combined. Nico studied a protein regulator in a pathway which modulates the cellular switch from a normal state to cancer. The examiners commended Nico on the approaches that he used to generate his data which represent a significant advance in the understanding of pathways that could lead to the inhibition of cancer.

Sharon Gail Mpheletso MOENO, B.Sc. (Hons) (Rhodes), in Chemistry.



Thesis: The effect of nanoparticles on the photophysicochemical behaviour of metallophthalocyanines.

Supervisor: Professor T Nyokong.

The candidate developed cancer specific drugs, which are activated by light, hence avoiding the devastating effects of chemotherapy. Using nanoscience, she developed a double action drug system which combines cancer treatment and diagnosis in one step. Her research represents a crucial step in the early diagnosis and treatment of cancer, and resulted in ten international publications.

Tawanda MUGADZA, M.Sc. (Zimbabwe), in Chemistry.



Thesis: Characterization and electrocatalytic applications of metallophthalocyanine-single walled carbon nanotube conjugates.

Supervisor: Professor T Nyokong.

The candidate developed a new, efficient and cheap method for making nanomaterials. He used these nanomaterials to design sensors for the detection of herbicides, with the aim of designing portable diagnostic tools for pollution monitoring. His research is a first step towards nanotechnology based water treatment. His work received a huge international interest resulting in nine publications.

Iain Douglas PATERSON, B.Sc. (Hons) (Rhodes), in Entomology



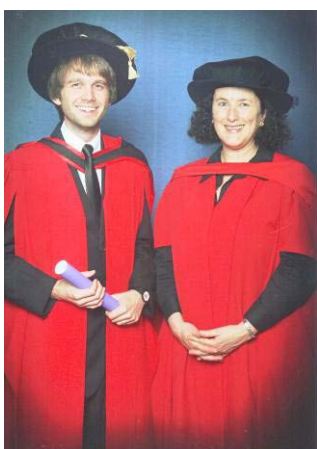
Thesis: Biological control of *Pereskia aculeata* Miller (*Cactaceae*).

Supervisor: Professor MP Hill.

Co-supervisor: Dr DA Downie.

Pereskia aculeata, commonly known as Barbados Gooseberry, is a climbing cactus weed that invades pristine coastal forests in South Africa. Mr. Paterson's thesis investigated the origins of this weed, its impact and more importantly methods for its control. He showed that biological control using introduced host specific insect species, offered the most effective control.

James Roswell SHORT, B.Sc. (Hons) (Rhodes), in Microbiology.



Thesis: An investigation into the replication biology *Helicoverpa armigera* stunt virus. **Supervisor:** Professor RA Dorrington.

An intriguing problem of modern biology is how viruses hijack cells and convert them into virus factories. James used fluorescence microscopy to track the movement of a virus replication protein in live cells, and observed the assembly of replication factories on the membranes of organelles from the endocytic pathway. His thesis lays the foundation for fundamental research that may lead to the development of novel antiviral therapies.

Andrew Robert SLAUGHTER, M.Sc. (Rhodes), in Water Resource Science.



Thesis: Modelling the relationship between flow and water quality in South African rivers.

Supervisor: Dr WJ Muller.

Co-supervisor: Professor DA Hughes.

Understanding the relationships between the quantity and quality of flow of water in rivers is a key component of managing water resources. The thesis uses a range of different models to quantify these relationships, and provides a stronger basis for understanding how water quality and quantity are interrelated, and a stronger basis for the management of water resources.

Renato Igino SPAGGIARI, B.Sc. (Hons) (Rhodes), in Geology.



Thesis: Sedimentology of Plio-Pleistocene gravel barrier deposits in the palaeo-Orange River mouth, Namibia: depositional history and diamond mineralisation.

Supervisor: Dr E Bordy.

Co-supervisors: Professor JM Moore and Dr J Ward.

The Orange River mouth hosts one of the world's greatest deposits of gem-quality diamonds. In a determined and meticulous field-focused study, Spaggs unravelled the complex interplay between river and marine processes that distributed diamonds along the Atlantic coast. His seminal dissertation significantly contributes to the efficient exploitation of diamond-rich deposits and the sedimentology of gravel beaches globally.

Suthananda Naidu SUNASSEE, B.Sc. (Hons) Rhodes, in Chemistry.



Thesis: Studies in marine quinone chemistry.

Supervisor: Professor MT Davies-Coleman.

Oesophageal cancer is prevalent in the Eastern Cape. Mr Sunassee has successfully used selected marine natural products as templates for the design and synthesis of novel chemical entities with enhanced oesophageal cancer-cell killing properties. An examiner at the US National Cancer Institute commented "This body of original work makes a significant contribution to natural products chemistry and organic synthesis"

Daniel Finsch VISSER, B.Sc. (Hons) (Rhodes), in Biochemistry.

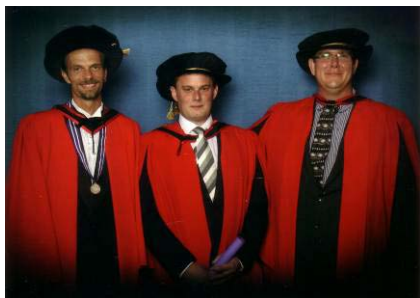


Thesis: Isolation and evolution of novel nucleoside phosphorylases.

Supervisor: Professor BI Pletschke. **Co-Supervisor:** Dr D Brady.

There are 33.4 million people living with HIV/AIDS. 5-Methyluridine is a common intermediate for the production of two important anti-retroviral drugs. Mr Visser combined specific enzymatic activities from two bacterial species to produce an 80% yield of 5-methyluridine, thus providing a new biosynthetic pathway for anti-retroviral drug design.

Henning WINKER, M.Res. (Plymouth), in Ichthyology.



Thesis: Post-impoundment population dynamics of non-native common carp *Cyprinus carpio* in relation to two large native cyprinids in Lake Gariep, South Africa.

Supervisor: Dr OLF Weyl.

Co-supervisor: Professor AJ Booth.

Globally, alien invasive fishes are a major threat to biodiversity. Mr Winker, undertook a detailed analysis of the population ecology of the alien common carp and two native fishes. By explaining why common carp are such successful invaders, and how native fishes respond to invasions, his research contributes not only to the field of invasion biology but will guide South Africa's national policy on alien fishes.

Alan Kenneth WHITFIELD, Ph.D. (Natal).

Senior Doctorate title: Contributions to the biology and ecology of fishes in South African estuaries.