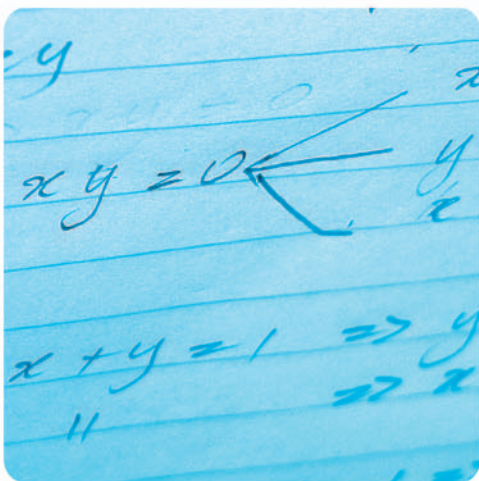
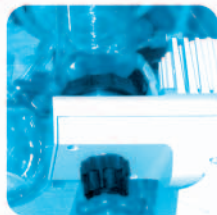


Faculty of Natural and Agricultural Sciences

Report 2008



Faculty of

**Natural and
Agricultural Sciences**

Report 2008

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Preface

From the Dean's Office

In 2008 the Faculty of Natural and Agricultural Sciences once again lived up to its vision to be acknowledged as a faculty that is at the forefront of the practice of natural and agricultural science where the highest levels of quality and credibility are reflected.

During the year the faculty not only remained one of the leaders in training and career development in the natural and agricultural sciences, but it also made a concerted effort to enlarge its international footprint and to establish itself internationally. This is evident in the visits of staff from the faculty to universities such as the USA-based University of Minnesota and Virginia Polytechnic Institute and State University (Virginia Tech) and the extension of international agreements between the University of the Free State (UFS) and these institutions. The faculty also had the privilege of hosting a high-level delegation from the University of Minnesota on the Main Campus in Bloemfontein in August 2008.

The turmoil in the international markets firstly led to very high oil prices, which spilt over to the grain markets and high food prices. This, in turn, led to high inflation levels and therefore high interest rates. Eventually the exchange rate also deteriorated against the major currencies. In the latter part of the year the whole situation was turned upside down with the collapse of the financial markets. The faculty did not escape this and the price of equipment for which orders were placed sky rocketed. Innovative skills had to be applied to remain on track with our equipment strategy.

Although 2008 was an exceptionally difficult year for the UFS and the institution had to bear the brunt of the Reitz video and the reaction of the national and international community, the faculty still managed to perform and expand its core business.

The faculty offers multi-disciplinary and holistic courses to send skilled and capable students into the South African workplace and to empower the labour force. Our general and extended programmes are continuously assessed and improved in order to improve our throughput rates and quality of teaching.

The staff at the faculty worked tirelessly this year to broaden our product offering and to provide our students with the best quality teaching in the country. I applaud their efforts of expanding capacity, developing programmes and strengthening re-



Prof. Herman van Schalkwyk.

lationships both within and outside the faculty and the university.

I also want to applaud the staff and students of the faculty with their achievements this year – whether it is on a personal level, in their capacity as staff member of their respective department/centre or for the faculty. To mention a few:

- Ms Estelle Heideman HIV/Aids coordinator of the Lengau Agricultural Development Centre, received a bursary to participate in a leadership programme in the United States of America (USA), which trains female leaders in South Africa who contribute to the prevention of HIV at a local, regional and national level;
- In the Department of Agricultural Economics, Prof. Johan Willemse, known for his contribution towards agriculture, was appointed on the non-executive board of Absa;

Staff in the dean's office



The staff working in the dean's office are, from the left, front: Ms Stefanie Naborn, Manager: Marketing and Liaison, Ms René Bloem, Secretary, Prof. Neil Heideman, Vice-Dean: Faculty of Natural and Agricultural Sciences; back: Mr Clasia Claassen, Assistant Administrative Officer, Mr Johan Kruger, Faculty Manager, Ms Lorinda Rust, Secretary, and Ms Mitzie Cloete, Typist/Clerical Assistant.

- Prof. James du Preez, Departmental Chair of the Department Microbial, Biochemical and Food Biotechnology, received the silver medal for exceptional published research awarded at the biennial conference of the South African Society for Microbiology hosted in Graham's Town. It was only the seventh time since 1986 that the medal was awarded;
- A study of the UFS about how the change in the packaging of DNA with cellular development is influenced by the expression of genes, in which Prof. Hugh Patterson played a leading role, was published in a leading peer-reviewed scientific journal *Proceeding of the National Academy of Sciences* of the USA (PNAS). The PNAS journal has an impact factor of 10, which means that studies published in this journal

are referred to by ten other scientific studies within the scope of two years;

- Prof. Riaan Luyt, professor in Chemistry and head of the Natural Sciences Programme at the Qwaqwa Campus, received an honorary medal from the Polymer Institute of the Slovak Academy of Sciences during a conference hosted in the High Tatras mountains of Slovakia;
- Prof. Maryke Labuschagne from the Department of Plant Sciences was the recipient of the National Science and Technology Forum's (NSTF) research capacity-development award. A team consisting of Prof. Jan van der Westhuizen and Dr Susan Bonnet from the Department of Chemistry, Prof. Kenneth Swart and Prof. Thinus van der Merwe from FARMOVS-PAREXEL also

received the innovation award for an outstanding contribution to science, engineering and technology by either an individual or a team over the last ten years from the NSTF;

- Prof. Maryke Labuschagne received a second prestigious national award for her research when the 2008 Cereal Science and Technology - SA's (CST-SA) Award for research and development was awarded to her; and
- Prof. Ivan Horak, extraordinary professor at the university's Department of Zoology and Entomology, became the third person in the history of the UFS to receive the D.Sc. degree.

In closing I would like to thank the faculty's lecturing staff for their support and enthusiasm during the past year. However, none of these achievements would have been possible without the interest and hard work of the administrative staff.

During 2008 we have all worked together to live up to the faculty's motto: "There is no substitute for excellence!" This report covers the activities of the faculty in 2008. It is a reflection of a year's commitment from a team of highly skilled academic and support staff.

Prof. Herman van Schalkwyk
Dean: Faculty of Natural and Agricultural Sciences
University of the Free State

Faculty news

Successful visit from delegation of the University of Minnesota

A senior delegation from the University of Minnesota in the United States of America (USA) paid a very successful visit to the University of the Free State (UFS) in May 2008 to explore ways of strengthening already existing ties between the two institutions.

Teacher training, capacity building in health sciences and student preparedness were among the areas of cooperation that were investigated, within the context of the Strategic Academic Cluster initiative of the UFS. Poverty reduction strategies were also a strong focus area.

The Faculty of Natural and Agricultural Sciences has had a cooperation agreement with the University of Minnesota's Department of Applied Economics since 2002 and the exchange of staff



During the visit are, from the left: Prof. Herman van Schalkwyk, Dean: Faculty of Natural and Agricultural Sciences at the UFS, Prof. Robert Jones, Senior Vice-President: System Academic Administration at the University of Minnesota, Dr Meredith Quiad, Associate Vice-President and Dean: International Programmes, University of Minnesota, Prof. Teuns Verschoor, Acting Rector of the UFS and Prof. Ezekiel Moraka, Vice-Rector: Student Affairs at the UFS.

has been taking place on a regular basis. This agreement will be expanded and both institutions are now exploring the possibility of

applying it across faculties. Both institutions have committed seed funding to formalise the cooperation agreement.

50 years of Agriculture celebrated



The faculty celebrated 50 years of the teaching of agriculture at the UFS in November 2008. Part of the celebrations was a seminar with the theme "Challenges in a changing agricultural environment". Some of the guest speakers are, from the left: Mr Corwyn Botha, Chairman: Agri Business Chamber and Managing Director of the Cape Agri Group, Mr Motsepe Matlala, President of NAFU, Mr Hans van der Merwe, Executive Head: Agri SA, Prof. Herman van Schalkwyk: Dean: Faculty of Natural and Agricultural Sciences at the UFS, and Mr Sugar Ramakarane, Head: Department of Agriculture, Free State Province.

Winners of NSTF awards assist with recruitment of students



Here are, from the left: Dr Martin Ntwaeaborwa, senior lecturer at the Department of Physics and finalist in the category for black researchers, Prof. Kenneth Swart, FARMOVS-PAREXEL, Prof. Maryke Labuschagne, head of Plant Breeding at the UFS's Department of Plant Sciences and female recipient of the award for the development of research capacity over the past five to ten years, and Prof. Jan van der Westhuizen, Department of Chemistry at the UFS; front: Ms Kedibone Aphane, MRC. Prof. Swart and Prof. Van der Westhuizen were the leaders of the team who received the award for the development of innovation by a corporate organisation or institution.

Representatives of the South African Medical Research Council (MRC) visited the UFS to recruit students who want to study in the fields of sci-

ence, engineering and technology. To assist with the recruitment, the winners of awards made by the National Science and Technology Forum (NSTF) earlier this year,

made presentations to create an interest amongst students. The UFS had four finalists of whom two were the winners in their respective categories.

Young scientists learn what faculty can offer



Young science lovers gathered in Sasolburg for the annual Sasol TechnoX in August 2008. The faculty's exhibition captured the learners' attention through an interactive representation of the application fields of science. Delegates from the Departments of Mathematics and Applied Mathematics, Chemistry, Zoology and Entomology, as well as UFS Marketing stood ready to answer the questions of the 20 832 learners who attended the event. Pictured here is Theo Viljoen, M.Sc. student in Forensic Entomology, sharing interesting facts regarding insects with learners.

Two UFS academics appointed on the Land Bank Board



Prof. Herman van Schalkwyk (left), Dean: Faculty of Natural and Agricultural Sciences, and Mr Theo Potgieter from the UFS School of Management were appointed on the Land Bank Board in March 2008. Prof. van Schalkwyk was appointed as Director and Deputy Chairperson and Mr Potgieter as Director of the Board. The appointments were made by the Minister of Agriculture and Land Affairs, Ms Lulu Xingwana, and are effective for a period of four years.

UFS extends exchange agreement with USA university



Here are, from the left, front: Dr SK de Datta, Vice-Rector: International Affairs, VT, Prof. Herman van Schalkwyk, Dean of the Faculty of Natural and Agricultural Sciences, UFS, Dr Martin Ntwaeaborwa, senior lecturer at the Department of Physics, UFS; back: Prof. Jim McKenna, Department of Crop, Soil and Environmental Affairs, VT, Prof. Izak Groenewald, Director of the Centre for Sustainable Agriculture and Rural Development at the UFS and responsible for the faculty's international liaison, Dr Michael Bertelsen, VT's international office, Dr Aldo Stroebel, Head: Internationalisation at the UFS and Dr Liesel Herselman, senior lecturer at the Department of Plant Sciences, UFS.

A delegation from the faculty visited the Virginia Tech University (VT) in the USA in June 2008 to confirm and extend the existing student exchange agreements between the two institutions.

During the visit the agreement, which started in 1997, was extended for the next five years. More than 150 students from both institutions have already taken part in this exchange agreement and it is the most successful student exchange agreement that VT is involved in. Although agricultural students from the UFS initially took part in the agreement, it was extended to other departments in the faculty and also to the rest of the UFS.

Itjoriseng Project launched



The faculty launched the Itjoriseng Project on the Main Campus in Bloemfontein in March 2008. The aim of the project is to improve the skills of teachers in the subjects Mathematics and Physical Science for Grades 10–12. "Itjoriseng" is the Sotho word for "sharpen yourself". At the launch were, from the left: Mr Mzamo Jacobs, Director: Curriculum Development for Further Education and Training, Free State Department of Education, Mr Johan Kruger, Faculty Manager, Ms Elna Marais, Chief Education Specialist: Curriculum Development, Free State Department of Education, and Prof. Herman van Schalkwyk, Dean: Faculty of Natural and Agricultural Sciences at the UFS.

2007 Faculty report launched



The faculty once again produced another report in which the various departments and centres highlighted their activities for 2007. The report was so well received that a second edition had to be printed. Here are some of the departmental chairpersons during the launch of the report in June 2008.

Department of

Microbial, Biochemical and Food Biotechnology

“Staff and students received national and international recognition for their achievements.” - Prof. James du Preez.



Prof. James du Preez.

Overview

The year 2008 was marked by an exceptional number of awards and other forms of national and international recognition of academic excellence of staff and students of this department.

At the year-end function of the Faculty of Natural and Agricultural Sciences, three members of the department received awards: probably the first time so many faculty awards went to members of one department. The recipients were Dr André van Tonder for service to the faculty, in recognition of his numerous contributions related to teaching; Prof. Esta van Heerden for academic entrepreneurship, in recognition of her successful ef-

forts in establishing and running the BioPAD Platform for Metagenomics in the department; Prof. Hugh Patterson for research, in recognition of the excellence of an article titled “*The Saccharomyces cerevisiae linker histone Hho1p is essential for chromatin compaction in stationary phase and is displaced by transcription*” in the prestigious international journal *Proceedings of the National Academy of Sciences of the USA*, which has a high impact factor of 10. He was the main author of this paper on how the change in the packaging of the DNA with cell development influenced the expression of genes. The South African Society for Microbiology

(SASM) awarded the silver medal for exceptional research achievement in any branch of microbiology to Prof. James du Preez, departmental chairperson, at the biennial congress of the society in Grahamstown.

Prof. Koos Albertyn improved his rating from the National Research Foundation (NRF) to a C2, and Prof. Garry Osthoff obtained a C3 rating, bringing the number of NRF-rated scientists in the department to a total of 12. Prof. Albertyn was invited to act as the opponent for a Ph.D. thesis defence that took place at the Department of Applied Microbiology, Lund University, Sweden in April. He and Prof. Rob Bragg were appointed to serve on the subcommittee of the Advisory Committee of the Genetically Modified Organisms Act (Act 15 of 1997). The function of this subcommittee is the evaluation of applications for the importation, use and development of genetically modified organisms (GMOs).

Students of the department also excelled academically. As usual, we had a good output of graduates in 2008: four Ph.D., 15 M.Sc. and 19 B.Sc. Honours degrees were conferred. A team comprising students from the Veterinary Biotechnology research group under the supervision of Prof. Rob Bragg won the prize for the best exhibit at the recent finals of the National Innovation Fund competition in Stellenbosch. A presentation by Ms Chantel Swart, a Ph.D. student under the supervision of Prof. Lodewyk Kock and Dr

Carlien Pohl-Albertyn, at the 46th annual meeting of the Microscopy Society of Southern Africa (MSSA) held in Gaborone, Botswana won the Leica prize for the best presentation on confocal microscopy. Lastly, Mr Ruan Ells had part of his M.Sc. dissertation accepted for publication in the high-ranking *Journal of Antimicrobial Chemotherapy* (impact factor 4,038). His study, concerning a procedure whereby the efficacy of antifungal drugs could be enhanced by using in combination with a fatty acid, was done under the supervision of Dr Pohl-Albertyn and Prof. Kock.

Another indicator of the high level of research activities and international involvement in the department is the fact that this year a record number of academics and students travelled beyond the borders of South Africa to participate in congresses or to undertake research visits to foreign countries. The number totalled 15 academics (some of whom travelled on more than one occasion), seven students and four post-doctoral fellows. The countries visited included Australia, Belgium, Botswana, Denmark, the United Arab Emirates (Dubai emirate), France, Germany, Greece, Mauritius, Mozambique, the Netherlands, Spain, Sweden, Switzerland, Turkey, Ukraine and the United States of America (USA). The combined national conference (Bio-08) of, respectively, Biotech SA, the South African Society for Microbiology and the South African Society of Biochemistry and Molecular Biology held in Grahamstown in January was well attended, with numerous poster and oral presentations by members of the department.

Representing the South African Fryer Oil Initiative (SAFOI, housed in the department), Prof. Lodewyk Kock and Dr Carlien Pohl-Albertyn presented the Steward's Principle Practitioner Award for 2007 to Felda Foods at their national product launch function on 2 July 2008 at Monte Casino, Gauteng. The award is based on the continuous involvement of Felda Foods in promising care of their edible oil products from "cradle to grave", i.e. from manufacturing to final dis-



A research team from the Department of Microbial, Biochemical and Food Biotechnology won the prize for the best exhibit at the finals of the National Innovation Fund competition in Stellenbosch. The same team had won the UFS leg of the competition. At the prize-giving ceremony are, from the left: Dr Eugene Lottering, Executive Director: Innovation Fund, students Kasweka Kakoma, Jay Lee and Lehlohonolo Mathengtheng, all from the Veterinary Biotechnology research group, and Minister of Science and Technology, Mr Mosibudi Mangena.

posal after use by food establishments, thereby also protecting the environment. These activities are in the process of being expanded to other Felda Food products that they will also display SAFOI's seal of approval. This will guide the consumer to make an informed choice when buying various foodstuffs.

On 28 and 29 September 2008, a total of 29 third-year microbiology students accompanied by Profs James du Preez and Stephanus Kilian undertook an excursion to South African Breweries Ltd (SAB), Gauteng. On the SAB side the excursion was facilitated by Prof. Bettie Lodolo, who is the SAB consultant: brewing science and hygiene as well as an affiliate associate professor of the department. The excursion comprised a lecture by Prof. Lodolo at the SAB Training Institute at Kyalami, a tour of the Alrode brewery and finally a visit to the SAB World of Beer in Johannesburg. The feedback from the students was very positive and this excursion will become an annual event.

A highlight of 2008 in terms of infrastructure was the completion of the Bioinformatics Laboratory adjacent to the Biotechnology

building. This 30-workstation lecturing facility for bioinformatics at under- and postgraduate levels and for providing computational support to research projects resulted from a grant to Prof. Pat-



Mr Ruan Ells, M.Sc. student whose article from his M.Sc. dissertation was accepted for publication in the *Journal of Antimicrobial Chemotherapy* (impact factor 4,038), with his supervisor, Dr Carlien Pohl-Albertyn.



Mrs Olufunke Awoyele, lecturer at the University of Ibadan, Nigeria setting up bioreactors for cultivating a yeast on an enzymatic hydrolysate of cassava peel. The aim of her project was the protein enrichment of waste from the cassava industry for use as animal feed.

terton for the establishment of a bioinformatics node at the UFS as a faculty facility that will link with the National Bioinformatics Network. Another highlight was the completion of the architect plans for the new two-storey wing to be added to the existing biotechnology building; only the interior detail planning remains to be done. This building will be erected on the northern side of the biotechnology building and will house the division of Food Science (ground floor) and large new undergraduate laboratories plus analytical labs, as well as a large seminar room on the second floor. An application for funding has been submitted to the Department of Education and it is likely that construction will commence within two or three years. This project also includes the general upgrading of the current biotechnology building.

The department received several visitors in 2008. Ms Olufunke Awoyele, lecturer at the University of Ibadan, Nigeria, worked for three months in the fermentation biotechnology laboratory to complete an essential part of her Ph.D. research (see photograph). Providing expertise, resources and

training towards the development of microbiological sciences in Africa is part of the mission of the department, which was appointed as an Industrial Biotechnology MIRCEN (Microbiological Resources Centre) by UNESCO in 1996. Prof. Emile van Zyl (Stellenbosch University) and Prof. Bärbel Hahn-Hägerdal (Lund University, Sweden, also a professor extraordinary in the department), visited the UFS in May and July, respectively. Each presented a lecture to the faculty on aspects of biofuel production from renewable feedstocks. Prof. Hahn-Hägerdal also presented a short course on yeast physiology and metabolic engineering related to bioethanol production to a group of our B.Sc. Honours students. In June a National Geographic team arrived to shoot a documentary film in the TauTona Mine, entitled "Naked Science: Journey through the Crust", while in September a documentary entitled "Inside Planet Earth" was filmed within the Beatrix Mine by a team from the Discovery Channel. Both of these documentaries centred around the research conducted in the BioPAD Metagenomics Platform in the department. Another visitor to the Metagenomics Platform was Prof. Gaetan Borgonie from the University Ghent, Belgium who spent a couple of months here to investigate the taxonomy of nematodes in the deep subsurface.

A major change in staff was brought about by the reinstatement in November of the Consumer Science division as a separate department. The multidisciplinary nature of Consumer Science did not fit in with the nature and modus operandi of the larger department; furthermore, within such a large department the identity of Consumer Science disappeared. By operating as a separate department from 1 January 2009 with its own identity and greater visibility, it will be possible to position and market Consumer Science better in respect of postgraduate students and research grants.

Mr Piet Botes, first professional officer who had been in charge of the department's analytical labora-

tory for 30 years, passed away in September. This was a great loss for the department, especially for those staff members who had worked with Mr Botes as a friend and colleague over many years. Mr Sarel Marais was appointed as senior professional officer in December to fill this important position. Other changes in staff also occurred during 2008. Dr Lizelle Piater resigned at the end of the year to take up a position at the University of Johannesburg. This vacancy has been filled by the appointment of Dr Dirk Opperman as lecturer. He is a former student who is currently a post-doctoral research associate at the Max Planck Institute in Germany and will only be able to take up the position in January 2010. Ms Jacqueline van Marwijk was therefore appointed as temporary junior lecturer in biochemistry for 2009 to assist with the lecturing. Dr Manjusha Joseph, senior professional officer in the lipid biotechnology group, resigned in August to take up a position as science communicator/project coordinator at the NRF, Pretoria. Drs Arno Hugo and Esta van Heerden were promoted to Associate Professor.

The department celebrates its 50th birthday in 2009. Festivities are planned for 12 and 13 March. This links with a series of events, starting at the end of 2008 and continuing in 2009, in celebration of the former Faculty of Agriculture turning 50 in 2008.

The department comprises three divisions, namely Microbiology and Biochemistry, Food Science and Consumer Science. Within these divisions there are various research groups. Although the overall research theme of the department is the broad field of microbial, biochemical and food biotechnology, the heterogeneous departmental composition results in some activities falling outside this field. Activities of some of these research groups not reported above are indicated below.

In the **Food Science division**, the dairy chemistry research of Prof. Garry Osthoff, head of the division, is expanding dramatically. He presented results on the role

of enzymes from yeast adjuncts in proteolysis during Cheddar cheese ripening at the International Dairy Federation (IDF) Symposium on "Ripening Characterization and Technology of Cheese" in Bern, Switzerland. The ongoing research is focused on protein and amino acid catabolism by these enzymes in cheese ripening. Prof. Osthoff is also researching milk evolution, which involves the study of the milk composition of non-dairy species, an area in which South Africa has much to offer. New oligosaccharides have been discovered in the milk of the African elephant and research collaboration on prebiotic oligosaccharides with the Obihiro University in Japan has been fruitful. The fat composition of the African species yielded interesting results and research on the milk proteins has been initiated. Further collaboration with researchers in Ireland and Germany was necessary to exploit these fields. The last word on cow's milk is also not out yet; the lactose content and fatty acid composition of the milk of indigenous African cattle breeds deviate from the norm and further investigation is required to provide a nutritional explanation.

Dr Maryna de Wit received funding to research the food quality aspects of cactus pears. There are more than 40 cactus pear cultivars in South Africa. No other country in the world has so many available; not even the countries of origin, the USA and Mexico. This is a hardy plant and suitable to be cultivated in arid regions. Although a few cultivars are currently economically exploited as fresh fruit, they do not perform equally well in all the regions of South Africa. In the past two years Dr de Wit and her students have shown how the food quality of cactus pears may vary over different geographic locations in South Africa. Apart from its use as fresh fruit, the high content of pectin and mucilage should render it an ideal fruit for juice and jam production. A comparative study on the contents of these polysaccharides in various cactus pear cultivars is currently under way.



UFS Microbiology students undertook an academic excursion to South African Breweries Ltd, Gauteng. The group is shown here at the SAB Alrode brewery.

The work of Ms Carina Bothma and Prof. Arno Hugo on pork quality was presented at the XXI World Congress of the International Federation for Home Economics in Lucerne, Switzerland. Their work focused on the improvement of the nutritional quality and sensory profile of pork by the inclusion of conjugated linoleic acid (CLA) in the diet of the animal. The sensory profile is important for acceptance by the consumer.

The Food Science division is also active in community development by presenting short courses in dairy processing. For the 9th year running, Drs Maryna de Wit and Celia Hugo presented a one-day short course in the production of value-added dairy products, focusing on the production of Gouda, feta and cottage cheese, Amazi and yoghurt. The aim of the short courses is to enable milk producers and entrepreneurs (mainly farmers) to add value to their product. Adding value to farm products has become the order of the day in the recent economic climate, and the commercial success of several past attendees has resulted from these courses.

During the month of August, several staff members and students of the **BioPAD Metagenomics Platform** represented the UFS in visits to various research institutions and conferences abroad. Dr Lizelle Piater

and Ph.D. students Ms Nathlee Abbai and Kamini Gounder visited the Institut für Mikrobiologie und Genetik, Georg-August-Universität, Göttingen, Germany, to respectively acquire knowledge on the construction of large-insert metagenomic libraries and complete the genome sequencing of a unique South African mine bacterial isolate. Due to the substantial progress made to date with the genome project, Ms Gounder was invited to stay for a further two months. Also, the library construction results of Ms Abbai will now lead to a joint collaborative project between the UFS and the group in Germany, with the possibility of an international exchange of students.

Profs Esta van Heerden and Derek Litthauer attended a prokaryotic gene annotation workshop at the J Craig Venter Institute in Rockville, Maryland, USA after which they moved on to San Diego, California for the Instruments, Methods, and Missions for Astrobiology XI Conference where Prof. Van Heerden presented an invited talk and submitted a publication on the group's work. Prof. Litthauer also joined the group in Göttingen to plan future collaboration with the Göttingen genomics laboratory and the Institut für Mikrobiologie und Genetik, before returning to South Africa. Prof. Van Heerden, accom-



Staff and students of the Department of Microbial, Biochemical and Food Biotechnology who participated in international conferences, workshops and research visits to foreign countries during 2008. Here are, from the left, front: Prof. Hugh Patterton, Dr Lizelle Piater, Prof. Lodewyk Kock, Dr Carlien Pohl-Albertyn, Prof. Rob Bragg, Ms Sonia van Zyl, and Prof. Martie Smit; middle: Profs Garry Osthoff, Esta van Heerden, James du Preez, Departmental Chairperson, Hester Steyn, Ms Carina Bothma, Profs Koos Albertyn, Bennie Viljoen, and Derek Litthauer; back: Ms Liezl Renz, Mr Ruan Ells, Ms Chantal Smith, Mr Walter Müller, Dr Elsabé Botes, Ms Ntsoaki Leeuw, Nathlee Abbai, Dr Khajamohiddin Syed, Ms Kamini Gounder, Dr Suman Pradhan.

panied by post-doctoral fellow Dr Elsabé Botes, subsequently visited GeoSyntec Consultants and was hosted by one of their principal investigators, Dr Mary DeFlaun (who also is an affiliate associate professor of the department). The aim was to investigate and learn field techniques associated with specialised *in situ* bioremediation technologies. The site investigations regarding remedial strategies for chromium included a naval air station that utilises bioaugmentation for remediation and two other sites using biostimulation as well as chemical and physical remediation strategies. The investigators are now forming a consultation unit for site investigations, remediation and environmental management.

Mr Errol Cason, M.Sc. student, paid a visit to Prof. TC Onstott at the Department of Geosciences at Princeton University, New Jersey, USA. Under the tutelage of Prof. Onstott, a world leader in his field, Mr Cason was taken through the process of microbial applications of geochemical modelling of geochemical water data taken from sites in South Africa. This trip was made possible by means of financial support provided by the NRF through a KIC free-standing travel grant. On the opposite side of the

world, Dr Antonio Garcia-Moyano, a post-doctoral fellow, presented a poster at the 12th International Symposium on Microbial Ecology, Microbial Diversity - Sustaining the Blue Planet Conference, organised by the International Society for Microbial Ecology (ISME) in Cairns, Australia.

Prof. Van Heerden and two Ph.D. students, Messrs Armand Bester and Godfrey Tlou, visited research collaborators at the Centro de Biología Molecular, University of Autónoma, Madrid, Spain, where the students also conducted experimental work. Prof. Van Heerden also visited the prestigious Centro de Astrobiología (CAB) to give a seminar and an overview of her group's research. CAB is the first astrobiology research institute outside of the USA to be associated with the National Aeronautics and Space Administration (NASA).

On the local scene, eight students of the Metagenomics Platform together with Profs Litthauer, Van Heerden and Dr Piater attended the Bio-08 Conference in Grahamstown in January where they gave five oral and three poster presentations. In September, the International Extremophiles 2008 conference held in Cape Town was attended by several members of the Metagenomics Platform. Prof.

Esta van Heerden gave both the keynote and an oral presentation and three post-doctoral fellows and one Ph.D. student presented posters.

Other highlights in the Metagenomics Platform this year include Dr Dirk Opperman accepting a post-doctoral fellowship at the Max Planck Institute in Mülheim, Germany and the student exchange with Spain, which included a post-doctoral fellow (Dr Daniel Vega Mendoza) and Ph.D. student (Mr Eloy Ferreras Puente) coming to work in the Metagenomics Platform.

Prof. Lodewyk Kock, who heads the **Lipid Biotechnology research group**, presented research on invitation at the 1st International Conference on Drug Design & Discovery held in Dubai, which was chaired by a Nobel Laureate, with the International Advisory Board comprising 14 Nobel Laureates. Prof. Kock, Dr Carlien Pohl-Albertyn and students delivered in total eight presentations at international conferences in Dubai, Botswana, Ukraine, and Greece. Dr Pohl-Albertyn and her M.Sc. student, Ruan Ells, were invited to present lectures at the 12th International Congress on Yeasts held in Kiev, Ukraine in August. Prof. Kock, in collaboration with the South African

Breweries, published a review article in one of the world's foremost specialised yeast journals, namely *FEMS Yeast Research*. Results from the M.Sc. study of student Mr Desmond Ncango were displayed on the cover page of all 2008 issues of the ISI-accredited *Canadian Journal of Microbiology*. This student also received the JP van der Walt prize for best M.Sc. dissertation in Yeast Science, the Andries Brink-Sasol prize for best M.Sc. dissertation in Microbiology, the Chris Small prize for an outstanding master's dissertation and the S₂A₃ bronze medal for an outstanding master's dissertation on original research in the Natural and Agricultural Sciences. In addition, the discovery of yeast biomechanics in micron space by this group was successfully applied in a graduate biology practical course by the top mycologist, Prof. John Taylor, from the University of California in Berkeley, USA. The Lipid Biotechnology group also contributed to South African and international scientific communities. They partially sponsored the 12th International Congress on Yeasts held in Kiev, Ukraine and presented a workshop for the North West Health Department on 27 June 2008 in Mafikeng. Six articles were published in the popular press and three radio interviews concerning this group's community services were broadcast.

The research facilities in the **Molecular Biology research group**, led by Prof. Koos Albertyn, received a boost by the acquisition of a state-of-the-art DNA sequencer through a grant awarded to Prof. Albertyn by the NRF National Equipment Programme. This grant covered 70% of the cost of the sequencer, which was in excess of R1.3 million, and the remaining funds were obtained from the Faculty of Natural and Agricultural Sciences and the UFS Directorate of Research Development. One aspect this research group is investigating is the development of highly efficient expression systems for the production of heterologous proteins, for both industrial and academic purposes. Dr Michel Labuschagne joined the research group as a post-doctoral research

fellow to further the development of such expression systems. Their other major research programme is on the regulation of alcohol dehydrogenases of *Saccharomyces cerevisiae* (baker's yeast) in collaboration with Prof. James du Preez of the **Fermentation Biotechnology research group**. Following the completion of the Ph.D. study of Dr Olga de Smidt, we now have a better understanding of the regulation of each of the five alcohol dehydrogenase isozymes. Dr De Smidt gave an oral presentation of results from her investigation at the 15th Biennial congress of the South African Society for Microbiology (SASM) held in Grahamstown in January. In addition, Prof. Du Preez gave an oral presentation of part of this research at the joint meeting of the divisions of the International Union of Microbiological Societies (IUMS) in Istanbul, Turkey in August. These findings will soon be submitted for publication. A review article titled "*The alcohol dehydrogenases of Saccharomyces cerevisiae: a comprehensive review*" has already been published in the prestigious journal *FEMS Yeast Research*. Dr Labuschagne and Ph.D. student, Ms Yolande Roodt, both of the Molecular Biology group, also presented results of their research at the Biennial SASM conference.

In the **Fermentation Biotechnology research group**, led by Profs Du Preez and Stephanus Kilian, further research on the physiological role of alcohol dehydrogenases, in collaboration with Prof. Albertyn (see above), focused on aerobic ethanol-limited chemostat cultures of a quadruple deletion mutant strain (Q1) of *S. cerevisiae* to determine to what extent Adh1 could substitute for the other alcohol dehydrogenase isozymes during growth on ethanol. Researcher Ms Laurinda Steyn showed that the growth of mutant strain Q1 (in which Adh1 was the only functional alcohol dehydrogenase) was comparable to the wild type strain, although the data suggested that the glyoxylate shunt was not fully functional in strain Q1, which influenced the biomass yield coefficient. Prof. Kilian's recent research on prebiotics showed that a sugar pre-

viously identified in our laboratory promoted the growth of probiotic yeasts that are used in pharmacological preparations to improve the intestinal microbial population. Prebiotics beneficially modify the intestinal microbial population when ingested, resulting in an improvement of the individual's health. New potential prebiotics produced by yeasts have also been identified. These results may be used to formulate synbiotics, which are combinations of prebiotics and probiotics. The research project on the fermentation of agave juice extract, in collaboration with Agave Distillers (Pty) Ltd., the only company outside Mexico that produced agave spirit (similar to the Mexican tequila), was concluded due to the liquidation of the company. An interesting finding of this research was that the ethanol productivity and yield of *Kluyveromyces marxianus* strains were comparable to commercial *Saccharomyces cerevisiae* strains. This highlighted the potential of *K. marxianus* for use in the agave fermentation, especially in view of its superior performance in batches of juice containing inhibitory compounds.

The **Biocatalysis research group** of Prof. Martie Smit focuses on the terminal hydroxylation of alkanes and alkylbenzenes by cytochrome P450 monooxygenases, but benzylic hydroxylation of alkyl phenols by vanillyl alcohol oxidases is also receiving attention. The Biocatalysis group started an eventful 2008 with all ten members of the group presenting their results at the Bio-08 Conference in Grahamstown in January. In May the group acquired the first SpectraMax2 plate reader in South Africa, bought with funding from the NRF, UFS and the Department of Science and Technology - NRF Centre of Excellence in Catalysis. Prof. Smit also obtained funding from the SA National Bioinformatics Network (NBN) and the UFS for the creation of a 3D-Molecular-Class-Specific Information System (3D-MCSIS) for the cytochrome P450 superfamily by Dr Henk-Jan Joosten of Bioproduct, Wageningen, the Netherlands. During June 2008 Prof. Smit spent

10 days in the Netherlands to work on the database with Dr Joosten in the laboratory of Prof. Gert Vriend in the Centre for Molecular and Biomolecular Informatics of the Nijmegen Centre for Molecular Life Sciences at Nijmegen University. In June Prof. Smit and post-doctoral fellow Dr Khajamohidden Syed also presented posters at the 9th International Symposium on P450 Biodiversity and Biotechnology in Nice, France. In November Prof. Smit organised a one and a half day Biocatalysis Breakaway at CATSA2008, the annual meeting of the Catalysis Society of South Africa. Three visitors from Germany presented talks at CATSA2008 and at the Biocatalysis Breakaway. They were Prof. Karl-Heinz Drauz from Evonik-Degussa, Dr. Vlada Urlacher from the Institute for Technical Biochemistry of Stuttgart University and Prof. Jürgen Pleiss, also from the Institute for Technical Biochemistry. At the end of November Prof. Smit hosted a visit by a four-man delegation from the Department of Science and Technology of the Ministry of Industry and Trade of Vietnam, who came to South Africa to investigate future collaboration on biodiversity. One of the members of the delegation, Dr. Vu Nguyen Thanh, was a post-doctoral fellow in the laboratory of Prof. Smit during 1994 – 1996.

Prof. Rob Bragg, who heads the **Veterinary Biotechnology research group**, was invited to a Mentofin Symposium in May that was held in Cappodocia, Turkey. He was one of the four invited speakers at this congress where he presented results from various contract projects involving the product Mentofin. Mentofin is a herb-based product that is produced in Germany and is now marketed worldwide for use in the poultry industry. This product reduces the severity of vaccination reactions in poultry vaccinated with live virus vaccines and reduces the impact of various bacterial diseases in poultry, thus reducing the reliance on antibiotics in this industry. In August he undertook a second visit to Turkey to attend the Virology congress of the joint meeting of the divisions of the International Union of Microbiolo-

gical Societies (IUMS) which was held in Istanbul, where he presented two talks and a poster. Two research teams from the Veterinary Biotechnology group entered the NRF national innovation fund competition. One team, consisting of Ms Alta Hattingh and Dr Kulsum Kondiah, submitted a business plan on the development of a vaccine for beak and feather disease virus. The other team, consisting of Mr Lehloholo Mathengtheng, Mss Kacey Kakoma and Jay Lee submitted a proposal on the use of bacteriophages for the control of bacterial diseases in poultry. This team won the University of the Free State leg of the competition and went on to compete at the finals in Stellenbosch, where they won the prize for the best exhibit at the show. On the research side, the development of a DNA vaccine for the control of beak and feather disease was successfully completed and tested in budgies, where an immune response was demonstrated.

The **Epigenomics and DNA Function research group** of Prof. Hugh Patterson is rapidly gaining momentum and improving its research facilities. January 2008 witnessed the installation of the

4000QTRAP mass spectrometer, fitted with an inline nanoflow HPLC, in the Facility for Genomics and Proteomics (FGAP). This instrument has expanded the capabilities of FGAP to allow protein identification, quantification and analyses of protein post-translational modifications, providing advanced proteomics capabilities on the UFS campus. Prof. Patterson attended two training workshops in Brussels, Belgium on the European Union Framework 7 funding schemes and also visited collaborators at the École Nationale Supérieure de Lyon in France in July. In September he attended a five-day training workshop on Quantitation in Mass Spectrometric Proteomics at the University of Southern Denmark in Odense, Denmark. In October three students from Prof. Patterson's group attended and presented posters as the MSSA2008 congress organised by the South African Association for Mass Spectrometry in Bela-Bela. December saw the delivery of a 3200QTRAP mass spectrometer, which will be placed in FGAP where it will be used for research by the UFS and also for demonstration purposes by Applied Biosystems in an agreement with the UFS. ■

Research outputs

Research articles

Barnard, T.G., Van Heerden, E., Bragg, R.R. & Albertyn, J. 2008. *Haemophilus paragallinarum* haemagglutinin: Role in adhesion, serotyping and pathogenicity. *Onderstepoort Journal of Veterinary Research* 75(1): 11-16.

Chipeta, Z.A., Du Preez, J.C. & Christopher, L. 2008. Effect of cultivation, pH and agitation rate on growth and xylanase production by *Aspergillus oryzae* in spent sulphite liquor. *Journal of Industrial Microbiology and Biotechnology* 35(6): 587-594.

Coetzee, R., Labuschagne, M.T. & Hugo, A. 2008. Fatty acid and oil variation in seed from kenaf (*Hibiscus cannabinus* L.). *Industrial Crops and Products* 27(1): 104-109.

De Smidt, O., Du Preez, J.C. & Albertyn, J. 2008. The alcohol dehydrogenases of *Saccharomyces cerevisiae*: A comprehensive review. *FEMS Yeast Research* 8(7): 967-978.

Dessaiegn, Y., Labuschagne, M.T., Osthoff, G. & Herselman, L. 2008. Genetic diversity and correlation of bean caffeine content with cup quality and green bean physical characteristics in coffee (*Coffea arabica* L.). *Journal of the Science of Food and Agriculture* 88(10): 1726-1730.

Du Preez, J.C., Van Rensburg, E. & Kilian, S.G. 2008. Kinetics of growth and leukotoxin production by *Mannheimia haemolytica* in continuous culture. *Journal of Industrial Microbio-*

logy and Biotechnology 35(6): 611-618.

Esterhuizen, J., Groenewald, I.B., Strydom, P.E. & Hugo, A. 2008. The performance and meat quality of Bonsmara steers raised in a feedlot, on conventional pastures or on organic pastures. *South African Journal of Animal Science* 38(4): 303-314.

Lodolo, E.J., Kock, J.L.F., Axcell, B.C. & Brooks, M. 2008. The yeast *Saccharomyces cerevisiae* – the main character in beer brewing. *FEMS Yeast Research* 8(7): 1018-1036.

Muchenje, V., Dzama, K., Chimonyo, M., Strydom, P.E., Hugo, A. & Raats, J.G. 2008. Sensory evaluation and its relationship to physical meat quality attributes of beef from Nguni and Bonsmara steers raised on natural pasture. *Animal* 2(11): 1700-1706.

Mudau, M.M. & Setati, M.E. 2008. Partial purification and characterization of endo- β -1,4-mannanases from *Scopulariopsis candida* strains isolated from solar salterns. *African Journal of Biotechnology* 7(13): 2279-2285.

Ncango, D.M., Swart, C.W., Goldblatt, M.E., Pohl, C.H., Van Wyk, P.W.J., Botes, P.J. & Kock, J.L.F. 2008. Oxy-lipin and mitochondrion probes to track yeast sexual cells. *Canadian Journal of Microbiology* 54(6): 450-455.

Ojo, A.O., Van Heerden, E. & Piater, L.A. 2008. Identification and initial characterization of a copper resistant South African mine isolate. *African Journal of Microbiology Research* 2(11): 281-287.

Opperman, D.J. & Van Heerden, E. 2008. A membrane-associated protein with Cr(VI) reducing activity from *Thermus scotoductus* SA-01. *FEMS Microbiology Letters* 280(2): 210-218.

Opperman, D.J., Piater L.A. & Van Heerden, E. 2008. A novel chromate reductase from *Thermus scotoductus* SA-01 related to Old Yellow Enzyme. *Journal of Bacteriology* 190(8): 3076-3082.

Osthoﬀ, G., Dickens, L., Urashima, T., Bonnet, S.L., Uemura, Y. & Van der Westhuizen, J.H. 2008. Structural characterization of oligosaccharides in the milk of an African elephant (*Loxodonta africana africana* L.). *Comparative Biochemistry and Physiology – B Biochemistry and Molecular Biology* 150(1): 74-84.

Osthoﬀ, G., Hugo, A. & De Wit, M. 2008. Milk composition of a free ranging white rhinoceros (*Ceratotherium simum*) during late lactation. *Mammalian Biology* 73(6): 245-248.

Staff

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Professors: Profs James du Preez, Rob Bragg, Stephanus Kilian, Lodewyk Kock, Derek Litthauer, Hugh Patterson, Martie Smit, Bennie Viljoen

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Junior Lecturers: Mss Sonia van Zyl, Petro Swart, Minnie Ras

Assistant Professional Officer: Ms Doretha Jacobs

Messenger: Ms Mary Makhapela

Schäfer, G., McEvoy, C.R.E. & Patterson H-G. 2008. The *Saccharomyces cerevisiae* linker histone Hho1p is essential for chromatin compaction in stationary phase and is displaced by transcription. *Proceedings of the National Academy of Sciences of the United States of America* 105(39): 14838-14843.

Sebolai, O.M., Pohl, C.H., Botes, P.J., Van Wyk, P.W.J. & Kock, J.L.F. 2008. The influence of acetylsalicylic acid on oxylipin migration in *Cryptococcus neoformans* var. *neoformans* UOFS Y-1378. *Canadian Journal of Microbiology* 54(2): 91-96.

Sebolai, O.M., Pohl, C.H., Botes, P.J., Van Wyk, P.W.J., Mzizi, R., Swart, C.W. & Kock, J.L.F. 2008. Distribution of 3-hydroxy oxylipins and acetylsalicylic acid sensitivity in *Cryptococcus* species. *Canadian Journal of Microbiology* 54(2): 111-118.

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Shimelis, H., Mashela, P.W. & Hugo, A. 2008. Performance of Vernonia as an alternative industrial oil crop in Limpopo Province of South Africa. *Crop Science* 48: 236-242.

Swart, C.W., Van Wyk, P.W.J., Pohl, C.H. & Kock, J.L.F. 2008. Variation in yeast mitochondrial activity associated with asci. *Canadian Journal of Microbiology* 54(7): 532-536.

Van der Merwe, M., Osthoff, G. & Pretorius, A.J. 2008. A canning quality model for small white bean lines selected for breeding (*Phaseolus vulgaris* L.). *South African Journal of Plant and Soil* 25(1): 22-31.

Reports

Opperman, D.J. & Van Heerden, E. 2008. *Determination of DDAC content on carrots*. Report to ICA International Chemicals (Pty) Ltd, Stellenbosch, South Africa.

Van Heerden, E. & Erasmus, M. 2008. *Determinations of DDAC content on grapes*. Report to ICA International Chemicals (Pty) Ltd, Stellenbosch, South Africa.

Van Heerden, E. & Erasmus, M. 2008. *Determinations of DDAC content on oranges*. Report to ICA International Chemicals (Pty) Ltd, Stellenbosch, South Africa.

Conference contributions

Abbai, N.S., Van Heerden, E., Piater, L.A. & Litthauer, D. 2008. *Improving cloning strategies for accessing extreme bacterial genomes*. Poster presented at the BIO-08 Combined Conference of the South African Society for Microbiology (SASM), Biotech SA and the South African Society for Biochemistry and Molecular Biology (SASBMB), Grahamstown, South Africa. 21-25 January.

Albertyn, J., De Smidt, O., Ntlhokoa, K. & Du Preez, J.C. 2008. *The role of alcohol dehydrogenase isozymes in the yeast Saccharomyces cerevisiae*. Lecture presented at the 15th Biennial Congress of the South African Society for Microbiology, Grahamstown, South Africa. 21-22 January.

Bester, P.A., Piater, L.A. & Van Heerden, E. 2008. *Ubiquitous nature of iron reductase from Thermus scotoductus SA-01*. Lecture presented at the BIO-08 Combined Conference of the South African Society for Microbiology (SASM), Biotech SA and the South African Society for Biochemistry and Molecular Biology (SASBMB), Grahamstown, South Africa. 21-25 January.

Bothma, C., Hugo, A. & De Kock, H.L. 2008. *Determination of the sensory profile of pork chops from pigs fed different concentrations of conjugated linoleic acid (CLA) as part of their diet*. Poster presented at the 21st World Congress of the International Federation for Home Economics (IFHE), Lucerne, Switzerland. 26-31 July.

Boucher, C.E., Albertyn, J. & Bragg, R.R. 2008. *An alternative method for the establishment of virulence of Newcastle Disease Virus isolates*. Poster presented at the 15th Biennial Congress of the South African Society for Microbiology, Grahamstown, South Africa. 21-22 January.

Boucher, C.E., Botes, P., Bragg, R.R. & Albertyn, J. 2008. *Evaluating the oncolytic properties of the La Sota strain of Newcastle Disease Virus (NDV)*. Lecture presented at the 15th Biennial Congress of the South African Society for Microbiology, Grahamstown, South Africa. 21-22 January.

Bragg, R.R. 2008. *In search of alternatives for antibiotics*. Lecture presented at the EWABO Mentofin Symposium, Cappadocia, Turkey. 1-4 May.

Chivian, D., Alm, E.J., Brodie, E.L., Culley, D.E., Gihring, T., Lapidus, A., Lin, L-H., Lowry, S., Moser, D.P., Richardson, P., Southam, G., Wanger, G., Pratt, L.M., Arkin, A.P., Hazen, T.C., Brockman, F.J., Onstott, T.C., Aubrey, A., Bada, J. & Van Heerden, E. 2008. *Shedding light on the terrestrial subsurface biosphere in deepest, darkest Africa through metagenomic analyses: Environmental genomics reveals a single, slowly evolving, species ecosystem deep within the Earth*. Lecture presented at the International Extremophiles 2008 Conference, Cape Town, South Africa. 7-11 September.

De Goede, E., Myburgh, J., Kilian, S.G. & Du Preez, J.C. 2008. *Growth characteristics of the yeast Candida mokoena*. Poster presented at the 15th Biennial Congress of the South African Society for Microbiology, Grahamstown, South Africa. 21-22 January.

Du Preez, J.C., De Smidt, O., Steyn, L. & Albertyn, J. 2008. *The use of multiple deletion mutants for determining the physiological role of alcohol dehydrogenase isozymes in Saccharomyces cerevisiae*. Lecture presented at the 12th International Congress of Mycology and the Joint Meeting of the Divisions of the International Union of Microbiological Societies (IUMS), Istanbul, Turkey. 5-9 August.

Ells, R., Kock, J.L.F., Van Wyk, P.W.J., Botes, P.J. & Pohl, C.H. 2008. *Effect of arachidonic acid on biofilm formation and antifungal susceptibility of two closely related Candida species*. Lecture presented at the 12th International Congress on Yeasts, Kiev, Ukraine. 23-27 August.

Ells, R., Kock, J.L.F., Van Wyk, P.W.J., Botes, P.J. & Pohl, C.H. 2008. *Effect of arachidonic acid on biofilm formation and antifungal susceptibility of two closely related Candida species*. Poster presented at the 12th International Congress on Yeasts, Kiev, Ukraine. 23-27 August.

Ells, R., Pohl, C.H., Kock, J.L.F. & Botes, P.J. 2008. *Effect of eicosapolyenoic fatty acids on metabolism and biofilm formation of Candida albicans*. Poster presented at the 15th Biennial Congress of the South African Society for Microbiology, Grahamstown, South Africa. 21-22 January.

Els, S.P., De Witt, F.H., Van der Merwe, H.J., Fair, M.D. & Hugo, A. 2008. *Influence of dietary lipid source on carcass traits of broilers*. Poster presented at the 10th World Conference on Animal Production (WCAP), Cape Town International Convention Centre, Cape Town, South Africa. 23-28 November.

Els, S.P., De Witt, F.H., Van der Merwe, H.J., Fair, M.D. & Hugo, A. 2008. *Effect of dietary lipid sources on production performances of broilers*. Poster presented at the 10th World Conference on Animal Production (WCAP), Cape Town International Convention Centre, Cape Town, South Africa. 23-28 November.

Els, S.P., Hugo, A., Bothma, C., De Witt, F.H. & Van der Merwe, H.J. 2008. *Influence of dietary lipid sources on sensory characteristics of broiler meat*. Poster presented at the 10th World Conference on Animal Production (WCAP), Cape Town International Convention Centre, Cape Town, South Africa. 23-28 November.

Els, S.P., Hugo, A., De Witt, F.H. & Van der Merwe, H.J. 2008. *Effect of dietary lipid sources on lipid oxidation of broiler meat*. Poster presented at the 10th World Conference on Animal Production (WCAP), Cape Town International Convention Centre, Cape Town, South Africa. 23-28 November.

Fuku, S.L., Piater, L.A. & Van Heerden, E. 2008. *Biological synthesis of gold nanoparticles by yeast*. Lecture presented at the BIO-08 Combined Conference of the South African Society for Microbiology (SASM),

- Biotech SA and the South African Society for Biochemistry and Molecular Biology (SASBMB), Grahamstown, South Africa. 21-25 January.
- García-Moyano, A., Piater, L.A., Litthauer, D., Onsott, T.C. & Van Heerden, E.** 2008. *Microbial ecology of fossil water trapped 3.6 km below the surface in a South African mine.* Poster presented at the 12th International Symposium on Microbial Ecology (ISME), Microbial Diversity – Sustaining the Blue Planet, Cairns, Australia. 17-22 August.
- García-Moyano, A., Piater, L.A., Raji, A., Möller, C., Fuku, S.L., Litthauer, D. & Van Heerden, E.** 2008. *Microbial ecology of biofilms found in South African deep mines.* Poster presented at the International Extremophiles 2008 Conference, Cape Town, South Africa. 7-11 September.
- Goldblatt, M.E., Van Wyk, P.W.J., Pohl, C.H. & Kock, J.L.F.** 2008. *Ascospore release and oxylipin production in the yeast Dipodascopsis.* Poster presented at the 15th Biennial Congress of the South African Society for Microbiology, Grahamstown, South Africa. 21-22 January.
- Gounder, K., Piater, L.A., Van Heerden, E. & Litthauer, D.** 2008. *Pyrosequencing of the extremophile Thermus scotoductus SA-07.* Lecture presented at the BIO-08 Combined Conference of the South African Society for Microbiology (SASM), Biotech SA and the South African Society for Biochemistry and Molecular Biology (SASBMB), Grahamstown, South Africa. 21-25 January.
- Gumede, S.P., Du Preez, J.C., Harrison, S.T.L. & Smit, M.S.** 2008. *Dicarboxylic acid production from n-alkane using Candida tropicalis ATCC20962 and Yarrowia lipolytica MTLY37 and FT120.* Poster presented at the 15th Biennial Congress of the South African Society for Microbiology, Grahamstown, South Africa. 21-22 January.
- Hattingh, A.R., Albertyn, J. & Bragg, R.R.** 2008. *Establishment of an ELISA with the expressed coat protein and purified Beak and Feather Disease Virus for detection of PBFV antibodies.* Lecture presented at the 15th Biennial Congress of the South African Society for Microbiology, Grahamstown, South Africa. 21-22 January.
- Hugo, A. & Van Schalkwyk, F.** 2008. *Improvement of fat quality of lean pigs by dietary intervention.* Proceedings of the 54th International Congress of Meat Science and Technology (54th ICoMST), CapeTown, South Africa. 10-15 August. pp. 1-4.
- Hugo, A. & Van Schalkwyk, F.** 2008. *Improvement of fat quality of lean pigs by dietary intervention.* Poster presented at the 54th International Congress of Meat Science and Technology (54th ICoMST), CapeTown, South Africa. 10-15 August.
- Jansen, A.C., Du Preez, J.C. & Albertyn, J.** 2008. *The effect of genetic transformation on the growth characteristics of *Arxula adenivorans*.* Poster presented at the 15th Biennial Congress of the South African Society for Microbiology, Grahamstown, South Africa. 21-22 January.
- Jordan, R., Piater, L.A. & Van Heerden, E.** 2008. *Chromate reduction by metal-resistant bacteria isolated from mining water.* Lecture presented at the BIO-08 Combined Conference of the South African Society for Microbiology (SASM), Biotech SA and the South African Society for Biochemistry and Molecular Biology (SASBMB), Grahamstown, South Africa. 21-25 January.
- Joseph, M., Reid, V.J., Pohl, C.H., Hugo, A., Van Wyk, A. & Kock, J.L.F.** 2008. *The quality of fried foods in South Africa.* Poster presented at the 6th Euro Fed Lipid Congress: Oils, Fats and Lipids in the 3rd Millennium, Athens, Greece. 7-10 September.
- Kakoma, K. & Bragg, R.R.** 2008. *Isolation and characterization of Escherichia coli bacteriophages from poultry.* Lecture presented at the 15th Biennial Congress of the South African Society for Microbiology, Grahamstown, South Africa. 21-22 January.
- Kock, J.L.F.** 2008. *Aspirin: The anti-inflammatory antifungal.* Lecture presented at the 1st International Conference on Drug Design and Discovery (ICDDD), Dubai, United Arab Emirates (UAE). 4-7 February.
- Kondiah, K., Albertyn, J. & Bragg, R.R.** 2008. *Developing a DNA vaccine for Psittacine Beak and Feather Disease.* Poster presented at the 15th Biennial Congress of the South African Society for Microbiology, Grahamstown, South Africa. 21-22 January.
- Kondiah, K., Albertyn, J. & Bragg, R.R.** 2008. *Development of a DNA vaccine for the control of Beak and Feather Disease Virus in parrots.* Lecture presented at the 12th International Congress of Mycology and the Joint Meeting of the Divisions of the International Union of Microbiological Societies (IUMS), Istanbul, Turkey. 5-9 August.
- Lacrampe-Couloume, G., Van Heerden, E., Piater, L.A., Opperman, D.J., Bester, P.A., Lippmann-Pipke, J., Slater, G.F., Onstott, T.C. & Sherwood Lollar, B.** 2008. *Microbial methanogenesis in ancient groundwaters in Witwatersrand Basin: The timing of deep subsurface life.* Poster presented at the 5th Astrobiology Science Conference (AbSciCon 2008), Santa Clara Convention Centre, Santa Clara, California, USA. 14-17 April.
- Lee, J-Y. & Bragg, R.R.** 2008. *Investigating methods of isolating and identifying possible unknown poultry viruses.* Poster presented at the 15th Biennial Congress of the South African Society for Microbiology, Grahamstown, South Africa. 21-22 January.
- Leeuw, N.J., Joseph, M., Pohl, C.H. & Kock, J.L.F.** 2008. *Utilization of palm breakdown products by *Cryptococcus curvatus*.* Poster presented at the 6th Euro Fed Lipid Congress: Oils, Fats and Lipids in the 3rd Millennium, Athens, Greece. 7-10 September.
- Leeuw, N.J., Swart, C.W., Ncango, D.M., Pohl, C.H., Sebolai, O.M., Strauss, C.J., Botes, P.J., Van Wyk, P.W.J. & Kock, J.L.F.** 2008. *Acetylsalicylic acid as antifungal in *Eremothecium* and other yeasts.* Poster presented at the 15th Biennial Congress of the South African Society for Microbiology, Grahamstown, South Africa. 21-22 January.
- Lippmann-Pipke, J., Erzinger, J., Zimmer, M., Kujawa, C., Van Heerden, E., Bester, P.A., Moller, H., Boettcher, M. & Rechtes, Z.** 2008. *Direct observation of blasting triggered goegas transport through an inactive fault system at 3.6 km depth, Tau Tona gold mine, South Africa.* Poster presented at the International Continental Scientific Drilling Program (ICDP) and the Integrated Ocean Drilling Program (IODP) Joint Colloquium, Hannover, Germany. 12-14 March.
- Mabwe, S., Theron, C., Syed, K., Albertyn, J. & Smit, M.S.** 2008. *Exploring hydrolase activity of recombinant *Pseudomonas putida* transformed with CYP102A1.* Poster presented at the 15th Biennial Congress of the South African Society for Microbiology, Grahamstown, South Africa. 21-22 January.
- Mathengtheng, L. & Bragg, R.R.** 2008. *Molecular characterization of *Mycoplasma gallisepticum* strains from South Africa.* Lecture presented at the 15th Biennial Congress of the South African Society for Microbiology, Grahamstown, South Africa. 21-22 January.
- Mayne, S. & Patterson, G-H.** 2008. *Software for analysis of cross-linked proteins by mass spectrometry.* Poster presented at the South African

- Association for Mass Spectrometry Conference, Bela Bela, South Africa. 12-16 October.
- Mfenyana, N.O. & Bragg, R.R.** 2008. *Isolation and characterization of a psittacine adenovirus from diseased parrots*. Poster presented at the 15th Biennial Congress of the South African Society for Microbiology, Grahamstown, South Africa. 21-22 January.
- Mfenyana, N.O. & Bragg, R.R.** 2008. *Isolation and characterization of a psittacine adenovirus from diseased Cape parrots in South Africa*. Lecture presented at the 14th International Congress of Virology and the Joint Meeting of the Divisions of the International Union of Microbiological Societies (IUMS), Istanbul, Turkey. 10-15 August.
- Müller, W.J., Smit, M.S., Van Heerden, E. & Piater, L.A.** 2008. *A novel archaeal cytochrome P450 isolated from a South African saltern*. Poster presented at the International Extremophiles 2008 Conference, Cape Town, South Africa. 7-11 September.
- Müller, W.J., Van Heerden, E. & Piater, L.A.** 2008. *Isolating a novel thermostable cytochrome P450 from the extremophile Thermus scotoductus SA-01*. Lecture presented at the BIO-08 Combined Conference of the South African Society for Microbiology (SASM), Biotech SA and the South African Society for Biochemistry and Molecular Biology (SASBMB), Grahamstown, South Africa. 21-25 January.
- Myburg, J., Osthoff, G., Hugo, A., De Wit, M. & Nel, J.** 2008. *Milk composition of South African beef cattle*. Poster presented at the 41st Annual General Meeting and Symposium of the South African Society of Dairy Technology (SASDT), Champagne Sports Resort, Central Drakensberg, South Africa. 14-16 April.
- Ncango, D.M., Kock, J.L.F., Swart, C.W., Pohl, C.H., Strauss, C.J., Van Wyk, P.W.J. & Botes, P.J.** 2008. *Oxylipin and mitochondrion probes to track asci of Ascoidea*. Poster presented at the 15th Biennial Congress of the South African Society for Microbiology, Grahamstown, South Africa. 21-22 January.
- Ncango, D.M., Kock, J.L.F., Swart, C.W., Pohl, C.H., Strauss, C.J., Van Wyk, P.W.J. & Botes, P.J.** 2008. *Oxylipin and mitochondrion probes to track asci of Ascoidea*. Poster presented at the 12th International Congress on Yeasts, Kiev, Ukraine. 23-27 August.
- Nel, J.F. & Steyn, H.J.H.** 2008. *The evaluation of mixed yarn fabrics of Gonometa postica silk, acrylic and wool*. Lecture presented at the 9th International Biannual Conference of the South African Association of Family Ecology and Consumer Science (SAAFECs), Pretoria, South Africa. 13-16 May.
- Nel, S., Albertyn, J., Labuschagne, M., De Kock, P., Du Preez, J.C. & Smit, M.S.** 2008. *Heterologous gene expression in non-conventional yeasts*. Lecture presented at the 15th Biennial Congress of the South African Society for Microbiology, Grahamstown, South Africa. 21-22 January.
- Ngubo, M. & Patterton, G-H.** 2008. *Post-translational modifications of histone tails during exit of stationary phase*. Poster presented at the South African Association for Mass Spectrometry Conference, Bela Bela, South Africa. 12-16 October.
- Ojo, A.O., Van Heerden, E. & Piater, L.A.** 2008. *Extremophiles from copper bioreactors and subsequent characterization of copper resistance genes*. Poster presented at the BIO-08 Combined Conference of the South African Society for Microbiology (SASM), Biotech SA and the South African Society for Biochemistry and Molecular Biology (SASBMB), Grahamstown, South Africa. 21-25 January.
- Onstott, T.C., Chan, E., Van Heerden, E., Litthauer, D., Bester, P.A., Rechtes, Z., Van Aswegen, G., Moller, H. & Lippmann-Pipke, J.** 2008. *An in situ bioseismicity experiment 3.6 km beneath the surface at NELSAM*. Lecture presented at the American Geophysical Union (AGU) Conference, San Francisco, California, USA. 14-18 December.
- Opperman, D.J., Piater, L.A., Litthauer, D. & Van Heerden, E.** 2008. *An Old Yellow Enzyme homologue from Thermus scotoductus SA-01*. Poster presented at the International Extremophiles 2008 Conference, Cape Town, South Africa. 7-11 September.
- Opperman, D.J., Sewell, T., Piater, L.A., Litthauer, D. & Van Heerden, E.** 2008. *An Old Yellow Enzyme homologue from Thermus scotoductus SA-01*. Lecture presented at the Conference of the Catalysis Society of South Africa (CATSA), Parys, South Africa. 9-12 November.
- Osthoff, G.** 2008. *Enzymes from yeast adjuncts in proteolysis during cheddar cheese ripening*. Poster presented at the 5th International Dairy Federation (IDF) Symposium on Cheese Ripening, Characterization and Technology, Berne, Switzerland. 9-14 March.
- Osthoff, G.** 2008. *The role of enzymes of yeast adjuncts in cheese ripening*. Lecture presented at the 41st Annual General Meeting and Symposium of the South African Society of Dairy Technology (SASDT), Champagne Sports Resort, Central Drakensberg, South Africa. 14-16 April.
- Osthoff, G., Hugo, A., De Wit, M. & Nguyen, M.** 2008. *Milk of other species: Blesbok milk*. Poster presented at the 41st Annual General Meeting and Symposium of the South African Society of Dairy Technology (SASDT), Champagne Sports Resort, Central Drakensberg, South Africa. 14-16 April.
- Pohl, C.H., Ncango, M.D., Swart, C.W., Van Wyk, P.W.J., Lodolo, E. & Kock, J.L.F.** 2008. *Oxylipin studies expose aspirin as antifungal*. Lecture presented at the 12th International Congress on Yeasts, Kiev, Ukraine. 23-27 August.
- Pradhan, S., Piater, L.A., Litthauer, D. & Van Heerden, E.** 2008. *Analysis of bacterial diversity and related assemblage of sulphur-reducers associated with South African Goldfield mines*. Poster presented at the International Extremophiles Conference, Cape Town, South Africa. 7-11 September.
- Roodt, Y., Bragg, R.R., Ismail, A. & Albertyn, J.** 2008. *Whole genome sequencing of Avibacterium paragallinarum through the use of GS technology*. Poster presented at the 15th Biennial Congress of the South African Society for Microbiology, Grahamstown, South Africa. 21-22 January.
- Sebolai, O.M., Pohl, C.H., Botes, P.J., Strauss, C.J., Van Wyk, P.W.J. & Kock, J.L.F.** 2008. *Oxylipin release in Cryptococcus neoformans*. Poster presented at the 15th Biennial Congress of the South African Society for Microbiology, Grahamstown, South Africa. 21-22 January.
- Sharma, P. & Patterton, G-H.** 2008. *Binding of H1 in chromatin*. Poster presented at the South African Association for Mass Spectrometry Conference, Bela Bela, South Africa. 12-16 October.
- Shuping, D.S.S., Syed, K., Theron, C., Albertyn, J. & Smit, M.S.** 2008. *Cloning of two cytochrome P450 monooxygenases (CYP13A and CYP17A) from Candida tropicalis ATCC20336 into Yarrowia lipolytica FT120*. Poster presented at the 15th Biennial Congress of the South African Society for Microbiology, Grahamstown, South Africa. 21-22 January.
- Siebrits, F.K., Makgekgenene, A. & Hugo, A.** 2008. *Effect of saponified high fat sunflower oilcake and lipoic acid on fat quality of lambs*. Poster pre-

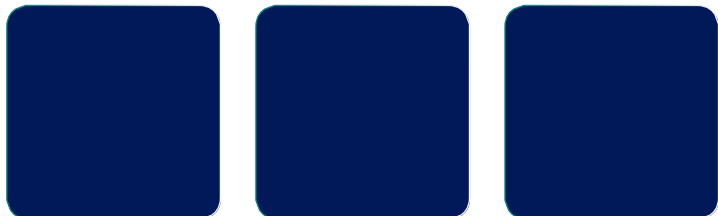
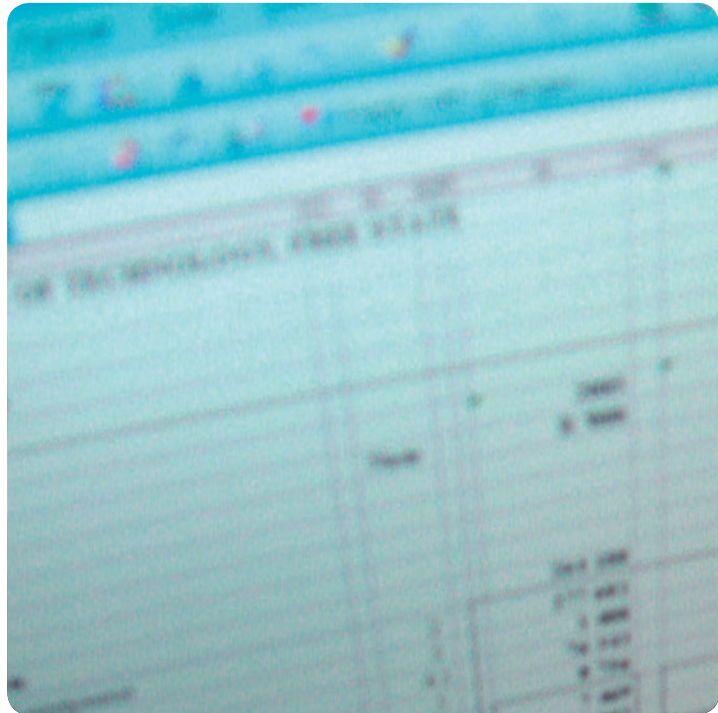
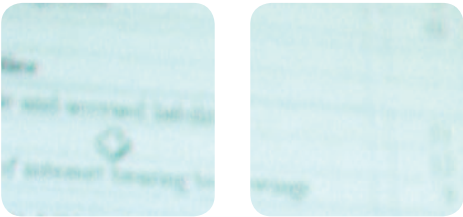
- sented at the 10th World Conference on Animal Production (WCAP), Cape Town International Convention Centre, Cape Town, South Africa. 23-28 November.
- Smit, M.S.** 2008. *Alkane and fatty acid hydrolases of alkane degrading yeasts*. Lecture presented at the BIO-08 Combined Conference of the South African Society for Microbiology (SASM), Biotech SA and the South African Society for Biochemistry and Molecular Biology (SASBMB), Grahamstown, South Africa. 21-25 January.
- Smit, M.S.** 2008. *The CYP52 family – terminal hydroxylases from alkane degrading yeasts*. Lecture presented at the Conference of the Catalysis Society of South Africa (CATSA), Parys, South Africa. 9-12 November.
- Smit, M.S. & Mabwe, S.** 2008. *Homology modeling of terminal hydroxylases from alkane utilizing yeasts*. Poster presented at the 9th International Symposium on Cytochrome P450 Biodiversity and Biotechnology, Nice, France. 8-12 June.
- Steyn, H.J.H. & Mafaesa, M.A.M.** 2008. *Solar baking, the environment friendly alternative to conventional retting of Agave americana fibre*. Poster presented at the 21st World Congress of the International Federation for Home Economics (IFHE), Lucerne, Switzerland. 26-31 July.
- Steyn, L., De Smidt, O., Ntlhokoa, K., Albertyn, J. & Du Preez, J.C.** 2008. *The role of alcohol dehydrogenase 1 and 2 in Saccharomyces cerevisiae*. Poster presented at the 15th Biennial Congress of the South African Society for Microbiology, Grahamstown, South Africa. 21-22 January.
- Swart, C.W., Pohl, C.H., Van Wyk, P.W.J. & Kock, J.L.F.** 2008. *Oxylipin accumulation in fermentative and non-fermentative yeasts*. Poster presented at the 15th Biennial Congress of the South African Society for Microbiology, Grahamstown, South Africa. 21-22 January.
- Swart, C.W., Pohl, C.H., Van Wyk, P.W.J. & Kock, J.L.F.** 2008. *Oxylipin accumulation in fermentative and non-fermentative yeasts*. Poster presented at the 12th International Congress on Yeasts, Kiev, Ukraine. 23-27 August.
- Swart, C.W., Van Wyk, P.W.J. & Kock, J.L.F.** 2008. *Electron and confocal microscopic examination of oxylipin accumulation in fermentative and non-fermentative yeasts*. Lecture presented at the 46th Annual Conference of the Microscopy Society of Southern Africa (MSSA 2008), University of Botswana, Gaborone, Botswana. 21-25 July.
- Syed, K., Randell, C., Albertyn, J. & Smit, M.S.** 2008. *Isolation and characterization of hydrocarbon degrading Acidovorax sp. – Implications for hydrocarbon uptake*. Lecture presented at the Conference of the Catalysis Society of South Africa (CATSA), Parys, South Africa. 9-12 November.
- Syed, K., Shiningavamwe, A., Albertyn, J. & Smit, M.S.** 2008. *Molecular cloning and sequence analysis of a novel cytochrome P450 gene CYP 557A1 from Rhodotorula retinophila CBS 8446*. Poster presented at the 9th International Symposium on Cytochrome P450 Biodiversity and Biotechnology, Nice, France. 8-12 June.
- Theron, C., Shiningavamwe, A., Setati, E., Obiero, G., Van Rooyen, N., Syed, K., Ramorobi, L., Mabwe, S., Albertyn, J., Nicaud, J-M. & Smit, M.S.** 2008. *Yarrowia lipolytica as a host for heterologous expression of cytochrome P450 monooxygenases*. Poster presented at the 15th Biennial Congress of the South African Society for Microbiology, Grahamstown, South Africa. 21-22 January.
- Tlou, G., Van Heerden, E. & Piater, L.A.** 2008. *A thermostable lipase from Geobacillus thermoleovorans GE-7 isolated from an ultra-deep South African gold mine*. Poster presented at the International Extremophiles 2008 Conference, Cape Town, South Africa. 7-11 September.
- Van Heerden, E., Litthauer, D., Piater, L.A. & Onstott, T.C.** 2008. *Metabolic promiscuity from the deep subsurface, a story of survival or superiority*. Lecture presented at the SPIE Optical Engineering and Applications Symposium, San Diego, USA. 10-14 August.
- Van Heerden, E., Litthauer, D., Piater, L.A. & Onstott, T.C.** 2008. *Metabolic promiscuity from Thermus scotoductus SA-01: An extensive investigation of the proteins from this thermophile from the deep subsurface*. Lecture presented at the International Extremophiles 2008 Conference, Cape Town, South Africa. 7-11 September.
- Van Heerden, E., Piater, L.A. & Litthauer, D.** 2008. *BioPad - UFS Metagenomics Platform: Endless opportunities!* Lecture presented at the Bio2Biz SA 2008 Conference, Sandton Convention Centre, Johannesburg, South Africa. 15-17 September.
- Van Marwijk, J. & Van Heerden, E.** 2008. *Characterization of nanoparticles produced by Thermus scotoductus SA-01*. Lecture presented at the BIO-08 Combined Conference of the South African Society for Microbiology (SASM), Biotech SA and the South African Society for Biochemistry and Molecular Biology (SASBMB), Grahamstown, South Africa. 21-25 January.
- Van Rooyen, N., Khajamohiddin, S. & Smit, M.S.** 2008. *Characterization of vanillyl alcohol oxidase activity in Fusarium spp.* Poster presented at the 15th Biennial Congress of the South African Society for Microbiology, Grahamstown, South Africa. 21-22 January.
- Van Zyl, J.C. & Steyn, H.J.H.** 2008. *Electrochemically activated water as a green alternative to phosphate laundry detergent*. Poster presented at the 21st World Congress of the International Federation for Home Economics (IFHE), Lucerne, Switzerland. 26-31 July.

Patents

- Du Preez, J.C. & Van Rensburg, E.** 2007/8. Growth medium for enhanced leukotoxin production. SA Patent no 2006/03853.



Statistical data

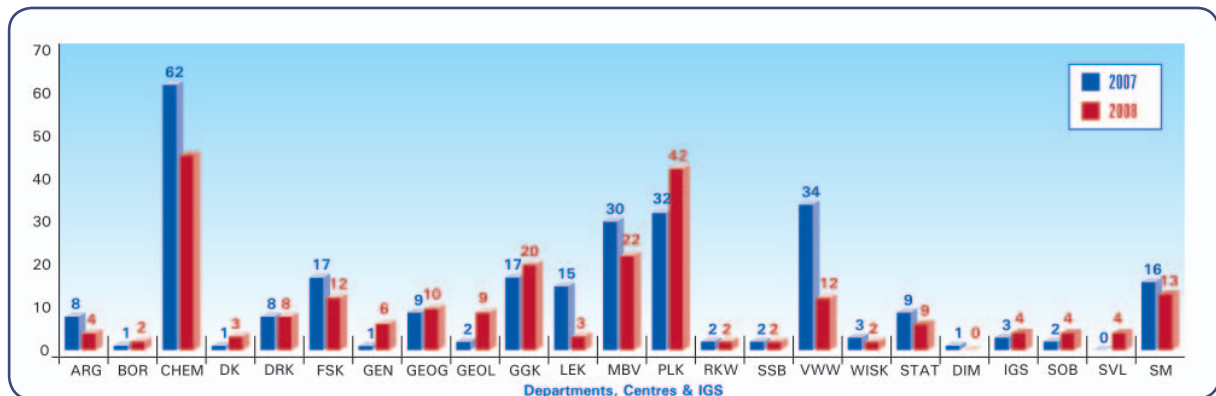


Research outputs: 2007-2008

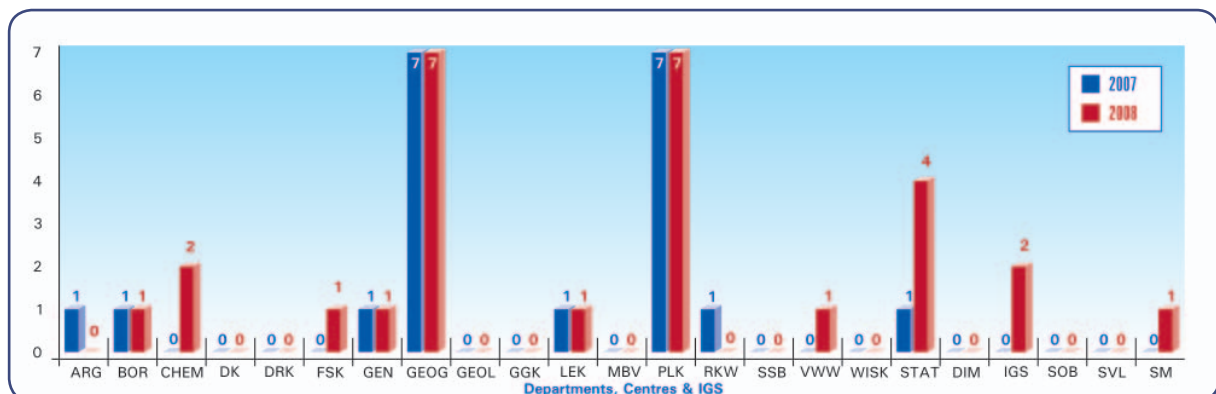
List of abbreviations

Abbreviation	Name	Abbreviation	Name
ARG	Department of Architecture	GGK	Department of Soil, Crop and Climate Sciences
BOR	Department of Quantity Surveying and Construction Management	IGS	Institute for Groundwater Studies
SOB	Centre for Environmental Management	LEK	Department of Agricultural Economics
CEM	Department of Chemistry	MBV	Department of Microbial, Biochemical and Food Biotechnology
SM	Centre for Microscopy	PLK	Department of Plant Sciences
SVL	Centre for Sustainable Agriculture and Rural Development	RKW	Department of Computer Science and Informatics
DK	Dean's Office	SSB	Department of Urban and Regional Planning
DRK	Department of Zoology and Entomology	SRB	Disaster Management Training and Education Centre for Africa (DIMTEC)
FSK	Department of Physics	VWW	Department of Animal, Wildlife and Grassland Sciences
GEN	Department of Genetics	STAT	Department of Mathematical Statistics and Actuarial Science
GEOG	Department of Geography	WISK	Department of Mathematics and Applied Mathematics
GEOL	Department of Geology		

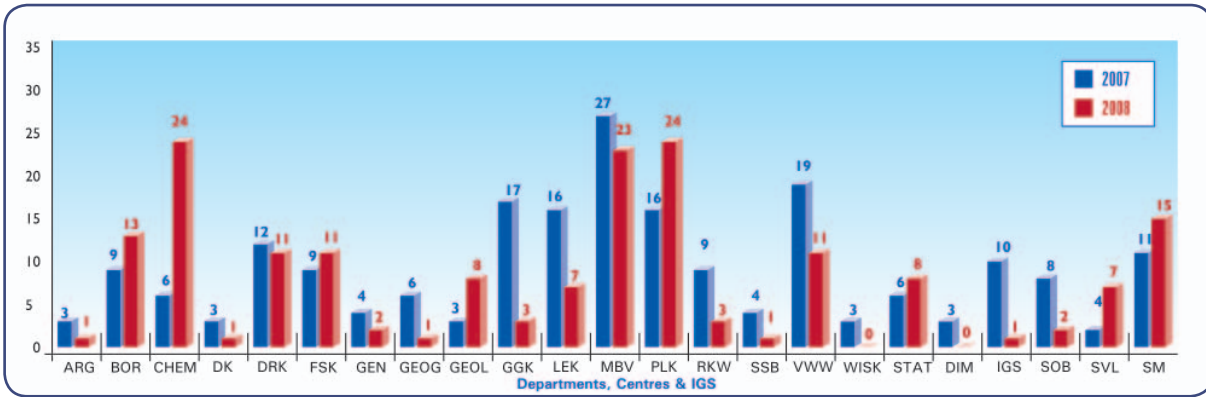
Accredited articles



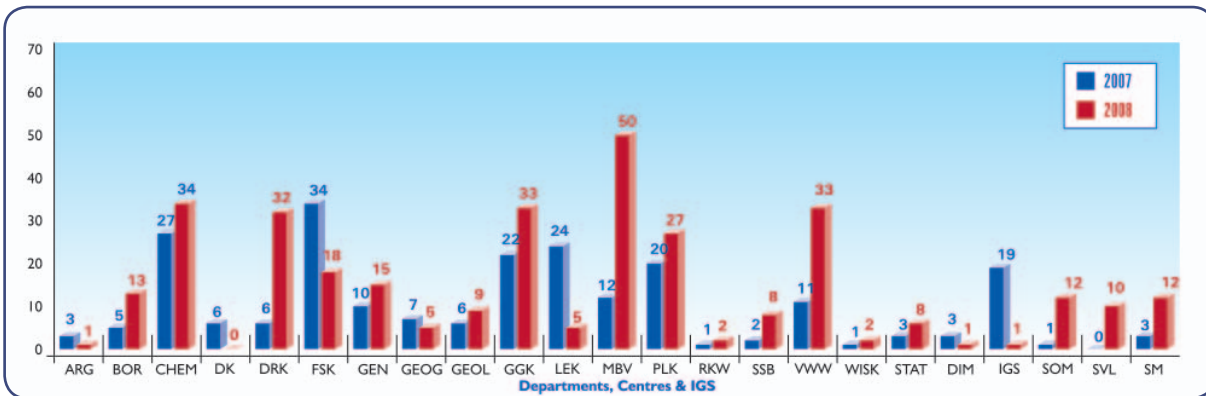
Books



International conferences



Local conferences



Student figures: 2007-2008

Student figures

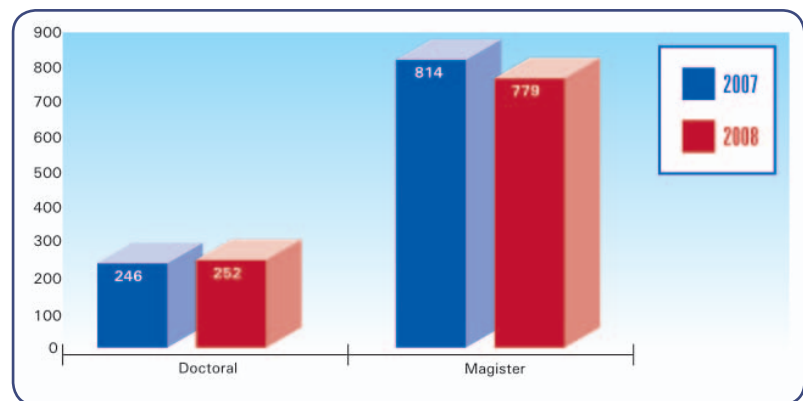
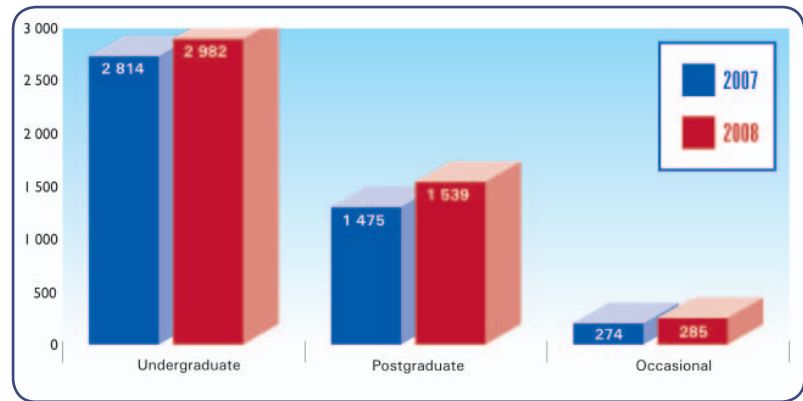
Year	Description	Black	Coloured	Asian	White	Total
2007	Undergraduate	1492	66	38	1218	2814
	Postgraduate	710	41	40	684	1475
	Occasional	230	6	2	36	274
*TOTAL		2432	113	80	1938	4563
2008	Undergraduate	1667	51	37	1227	2982
	Postgraduate	755	40	43	701	1539
	Occasional	260	5	1	19	285
* TOTAL		2682	96	81	1947	4806

International students

Nationality	Year	Year
	2007	*2008
Angola	2	0
Asian countries	20	24
Botswana	17	23
Democratic Republic of the Congo	0	1
European countries	9	10
Lesotho	118	144
Malawi	3	5
Mauritius	2	3
Mozambique	4	7
Namibia	54	65
North America	15	5
Other African countries	47	69
South America	1	0
Swaziland	5	6
Zambia	7	7
Zimbabwe	48	60
Total	352	429

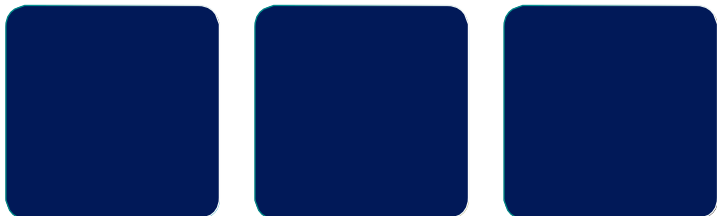
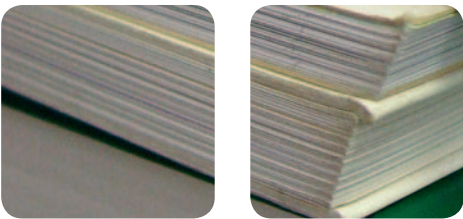
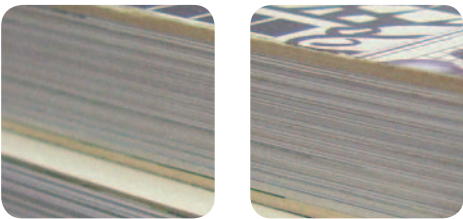
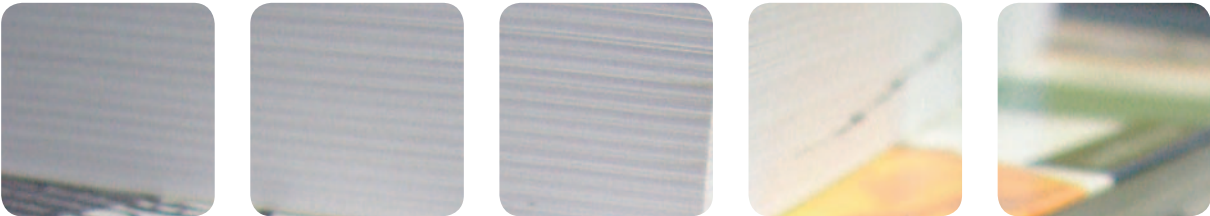
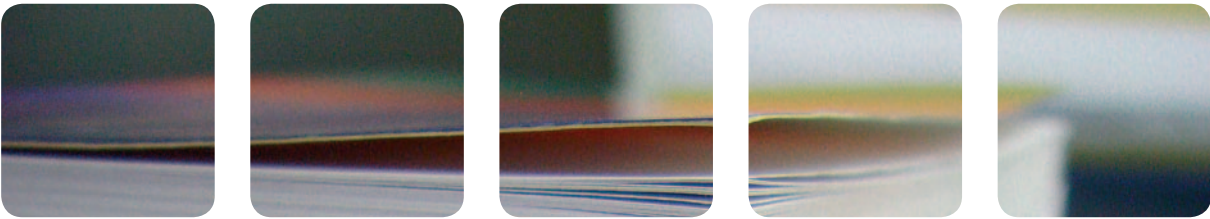
*2008 Final HEMIS figures not available

Comparison for the Faculty of Natural and Agricultural Sciences





Glossary



Glossary

A

AACC -	American Association for Cereal Chemists
AACE -	Association for the Advancement of Cost Engineering
ADF -	Amsterdam Density Functional Programme
ADG -	Average Daily Grain
AEASA -	Agricultural Economics Association of South Africa
AEON -	the African Earth Observation Network
AGU -	American Geophysical Union
AI -	Artificial Insemination
ARC -	Agricultural Research Council
ARV -	Antiretroviral
ASC -	Architecture Student Conference
ASAQS -	Association of South African Quantity Surveyors
ASOCSA -	Association of Schools of Construction of Southern Africa

B

BBSRC -	Biotechnology and Biological Sciences Research Council
BMBF -	Federal Ministry of Education and Research, Germany

C

CAA -	Commonwealth Association of Architects
CANSA -	Cancer Association of South Africa
CAB -	Centro de Astrobiología
CED -	Centre for Education Development
CePHMa -	Centre for Plant Health Management
CHESD -	Centre for Higher Education Studies and Development
CHPC -	Centre for High Performance Computing
CIDB -	Construction Industry Development Board
CIOB-SA -	Chartered Institute of Building, South Africa
CSIR -	Council for Scientific and Industrial Research Organisation
CSTA -	Cereal Science and Technology Association
CUT -	Central University of Technology

D

DiMTEC -	Disaster Management Training and Education Centre for Africa
DMISA -	Disaster Management Institute of Southern Africa
DRRW -	Durable Rust Resistance in Wheat
DST -	Department of Science and Technology
DWAF -	Department of Water Affairs and Forestry

E

ECA -	European Crystallographic Association
EGIC -	Economic Growth and International Competitiveness
EMSA -	Environmental Management Systems Association
EMS -	Environmental Management Systems
EPWP -	Expanded Public Works Programme

F

FAO -	Food and Agricultural Organisation
FETWater -	Framework Programme for Research Education and Training in Water
FMP -	Facilities Management Programme
FSRDPP -	Free State Rural Development Partnership Project
FTIR -	Fourier Transform Infra Red Spectrometer

G

FGAP -	Facility for Genomics and Proteomics
GIS -	Geographical Information Systems
GMO -	Genetically Modified Organisms
GRDM -	Groundwater Resource Directed Measures
GSSA -	Grassland Science Society of South Africa
GSSA -	Geological Society of South Africa

H

HCI -	Human-computer Interaction
HRTEM -	High Resolution Transmission Electron Microscopy

I

IAMA -	International Food and Agribusiness Management Association
IAU -	International Astronomical Union
ICACS -	International Conference on Atomic Collisions in Solids
ICCC -	International Conference on Coordination Chemistry
ICEC -	International Cost Engineering Council
ICRISAT -	International Crops Research Institute for the Semi-Arid Tropics
ICSU -	International Council for Science
IDC -	Industrial Development Corporation
IGC -	International Geological Congress
IGS -	Institute for Groundwater Studies
IMWA -	International Mine Water Association
INCRoP -	Insects on New Crops Programme
IPMP -	Intensive Project Management Programme
ISI -	International Statistical Institute
ISME -	International Society for Microbial Ecology
IT -	Information Technology
IUMS -	International Union of Microbiological Societies

L

LPI -	Lunar and Planetary Institute
LRAD -	Land Redistribution for Agricultural Development

M

MCEE -	Minnesota Council on Economic Education
MDC -	Maputo Development Corridor
MEC -	Member of the Executive Council
MNS -	Material and Nanosciences Cluster
MOU -	Memorandum of Understanding
MRC -	Medical Research Council
MSA -	Masters in Sustainable Agriculture
MSSA -	Microscopy Society of Southern Africa
MUCPP -	Mangaung University Community Partnership Programme

N

NAMC - National Agricultural Marketing Council
 NASA - National Aeronautics and Space Administration
 NASSP - National Astrophysics and Space Science Programme
 NBN - National Bioinformatics Network
 NCEE - National Council for Economic Education
 NDF - Neutral Detergent Fibre
 NECSA - Nuclear Energy Corporation of South Africa
 NERPO - National Emergent Red Meat Producers Organisation
 NGO - Non-Governmental Organisation
 NRF - National Research Foundation
 NSTF - National Science and Technology Forum
 NWGA - National Wool Growers' Association

O

OECD - Organisation for Economic Cooperation and Development

P

PAQS - Pacific Association of Quantity Surveyors
 PDMS - Provincial Disaster Management Centre
 PRT - Protein Research Trust

R

RDP - Redress and Development Programme
 RIBA - Royal Institute of British Architects
 RICS - Royal Institute of Chartered Surveyors
 RIEP - Research Institute of Education Planning
 RMMA - Red Meat Abattoirs Association
 RPO - Red Meat Producers Organisation
 RTPI - Royal Town Planning Institute

S

SA - South Africa
 SAAPMB - South African Association of Physicists in Medicine and Biology
 SAB - South African Breweries Limited

SABC - South African Broadcasting Corporation
 SACAP - South African Council for the Architectural Professions
 SACPCMP - South African Council for the Property Valuers Profession
 SACPLAN - South African Council of Planners
 SACQSP - South African Council for the Quantity Surveying Profession
 SADC - Southern African Development Community
 SAFA - South African Feedlot Association
 SAFEFE - South African Foundation for Economic and Financial Education
 SAFOI - South African Fryer Oil Initiative
 SAIA - South African Institute of Architects
 SAIM - Society for Industrial and Applied Mathematics
 SAISC - Southern African Institute of Steel Construction
 SANBI - South African National Biodiversity Institute
 SANCID - South African Commission on Irrigation and Drainage
 SANPAD - South African Netherlands Research Programme on Alternatives in Development
 SANSA - South African National Survey of Arachnida
 SAPOA - South African Property Owners Association
 SAPPS - Symposium of the South African Pecan Producers Association
 SAQA - South African Qualifications Authority
 SASA - South African Statistical Association
 SASHS - Southern African Society for Horticultural Sciences
 SASM - South African Society for Microbiology
 SAWMA - South African Wildlife Management Association
 SAWSS - Southern African Weed Science Society
 SCM - Scientific Computing and Modeling
 SEG - Society of Economic Geologists
 SEM - Scanning Electron Microscope

SLE - Senior Lecturer Equivalent
 SSSSA - Soil Science Society of South Africa
 SWMA - Southern African Wildlife Management Association

T

TEM - Transmission Electron Microscope
 THRIP - Technology and Human Resource for Industry Programme

U

UCT - University of Cape Town
 UEC - Unit for Earth Construction
 UFS - University of the Free State
 UJ - University of Johannesburg
 UK - United Kingdom
 UN - United Nations
 UNESCO - United Nations Educational, Scientific and Cultural Organisation
 UNU - United Nations University
 UP - University of Pretoria
 USA - United States of America
 USAID - United States Agency for International Development
 UWC - University of the Western Cape

W

WCAP - World Conference on Animal Production
 WITS - University of the Witwatersrand
 WRC - Water Research Commission

