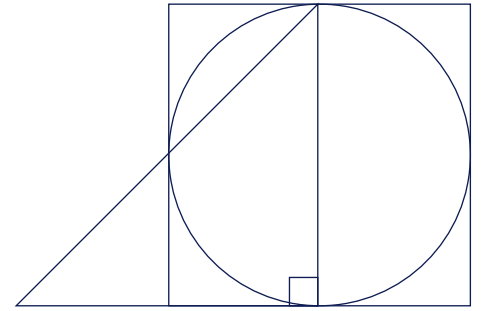


Report

05/06



Faculty of Natural and Agricultural Sciences



Faculty of Natural and Agricultural Sciences

Issued by:
Faculty of Natural and Agricultural Sciences,
University of the Free State

Editorial committee
Lacea Loader
Leonie Bolleurs

Language revision
Nanette Lötter

Revision of bibliographical data
Mercia Coetzee

Layout and cover design
Chrysalis advertising and publishing

Photographers
Gerhard Louw
Stephen Collett

Printing
Print 24

The Afrikaans version is also available on a compact disc
from the dean's office or on the university's website at
www.ufs.ac.za.

Cover page: Aspects of natural and agricultural sciences.

Contact details

Dean

Prof. Herman van Schalkwyk
+27 51 401 2535
hvs.sci@ufs.ac.za

Vice-Dean

Prof. Neil Heideman
+27 51 401 3855
heidemannj.sci@ufs.ac.za

Office of the Dean

Ms Lorinda Rust
+27 51 401 2322
rustl.sci@ufs.ac.za

Faculty Manager

Ms Corné Havemann
+27 51 401 2490
havemach.sci@ufs.ac.za

Liaison

Mr Nelis Maeder
+27 51 401 2531
maedecj.stg@ufs.ac.za

Physical address of the office of the Dean

Room 9A, Biology Building, Main
Campus, Bloemfontein

Postal address

University of the Free State
PO Box 339
Bloemfontein
South Africa
9300

Fax

+27 51 401 3728

Faculty website

www.ufs.ac.za

From the Dean's office



Prof. Herman van Schalkwyk.

The Faculty of Natural and Agricultural Sciences at the University of the Free State (UFS) leads the way in the practising of natural and agricultural sciences in South Africa and the highest levels of quality and credibility are reflected.

Our commitment, however, reaches far beyond just this. It reaches beyond the borders of the country and across continents; its multi-disciplinary and practical approach is vested in all the disciplines presented by the faculty.

In 2005/06 the Faculty experienced significant growth in measurable outputs. A contributing factor was the comprehensive apparatus strategy and plan which was implemented in 2005. With this strategy, university funds were used to leverage other funds in order to obtain huge discounts from suppliers of apparatus. In this way the faculty managed to obtain almost R50 million worth of apparatus in 2005.

The strategy was continued in 2006 when an agreement to the value of R7 542 531 was reached with Shimadzu, according to which apparatus was supplied to the faculty at discount prices. The agreement, which is valid for three years, entails the free replacement of apparatus which is purchased during this period with upgraded versions.

The new apparatus forms part of the UFS vision to compete internationally with quality research outputs in certain niche areas, to provide leadership in advanced training to students from the African continent and to establish the university as a leader among South African universities.

Two researchers with a B rating from the National Research Foundation (NRF) were also appointed. Both of these initiatives bore fruit and in 2006 the faculty increased its total research outputs by

about 13%. As an example, the Department of Chemistry's outputs increased by 100%.

The faculty has been bursting at the seams over the past couple of years. Student figures rose from 3 935 undergraduate, postgraduate and occasional students in 2005, to 4 224 in 2006. There is also strong representivity of students from other African countries and in 2005/06 almost 600 students studied at the faculty.

An extended B.Sc. programme has been presented to students since 2005. The programme aims at providing students who do not comply with all the requirements for the B.Sc. programme with the necessary sub-structure to complete the B.Sc. degree successfully. A preliminary evaluation of the results indicates that the programme is delivering the desired results.


The alignment of the Qwaqwa Campus, which was incorporated into the UFS in January 2003, remains a challenge. Regular discussions are held with staff on the campus in order to make the faculty's programmes more sustainable and to align it with the broader strategic plan of the UFS.

On a national level, the faculty is in the process of making its mark in terms of teaching and community service. In 2005 the faculty again actively began utilising its

experimental farms. A three-way agreement between the UFS, the National Farmers Union (NAFU) and the Mangaung Local Municipality led to the establishment of the Lengau Agricultural Development Centre on the Sydenham Experimental Farm. The centre provides training and mentorship to small-scale upcoming farmers.

To be dynamic and progressive requires innovative thinking. It requires commitment and a desire to deliver excellent teaching and learning opportunities to students. It requires a willingness to form partnerships, and a multi-disciplinary and practical approach to the tertiary education environment in South Africa.

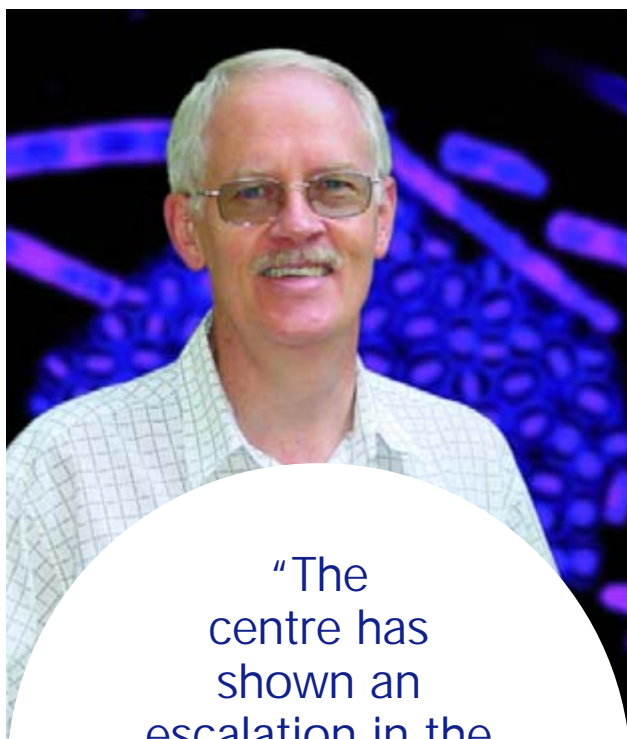
This report covers the faculty's activities in 2005/06. It is a reflection of two years' commitment on the part of a team of skilled and motivated academics and support staff.



Prof. Herman van Schalkwyk

Dean: Faculty of Natural and Agricultural Sciences
University of the Free State

Confocal and Electron Microscopy



“The centre has shown an escalation in the utilisation of its facilities since its establishment in 2003.”

Prof. Pieter van Wyk.

Overview

Research and training outputs at the Centre for Confocal and Electron Microscopy (CCEM) are determined by the period of use of the apparatus and laboratories, as well as by the publications and conference presentations of the users.

The CCEM is a service facility of the Faculty of Natural and Agricultural Sciences available to departments and external users. Researchers and students of this faculty form the principal user group and several researchers and students from other universities and abroad periodically use the facilities through collaborated research projects. The centre has shown a steady escalation in the use of its facilities since its establishment in 2003, and the apparatus has been used by several postgraduate students for research and study purposes.

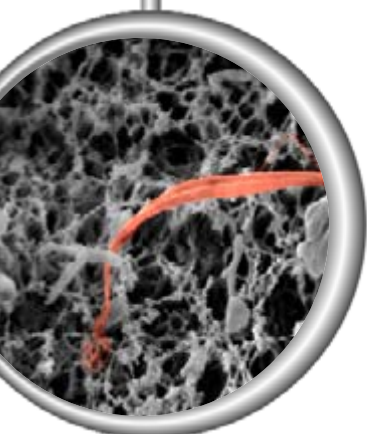
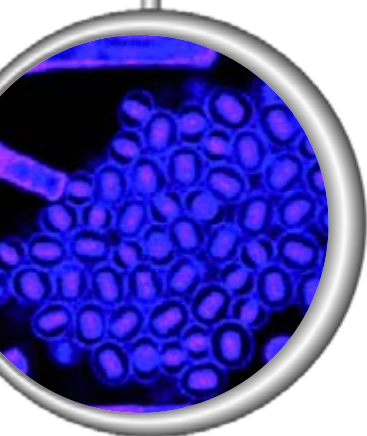
In 2005 the CCEM presented several courses to honours students in the departments of Zoology and Entomology, Microbial, Biochemical and Food Technology and Plant Sciences at the UFS. The duration of each of these courses is three days and they are presented separately to each group. Various postgraduate students from these departments used the apparatus for their research and study projects.

The new Shimadzu scanning electron microscope installed in 2006 was a welcome and useful addition to the centre. A workshop was presented to introduce the new microscope to researchers at the UFS.

A workshop was also presented in collaboration with the Department of Zoology and Entomology for researchers in the preparation of material for the confocal microscope to promote the application of this microscope. A guest presenter, Ms Anne Grobler, was invited from the North-West University.

The most recent microscope installed is a Nikon confocal laser scanning microscope, which produces three-dimensional images of fluorescing biological samples.

Several research activities culminated in a collaborated research project with the Lipid Biotechnology group of the Department of



The installation of the new Shimadzu scanning electron microscope. Staff of the centre undergoing training by the Japanese engineer.

Microbial, Biochemical and Food Technology. An international symposium was attended in Berlin by postgraduate students of this research group under the supervision of Proff. Lodewyk Kock and Pieter van Wyk, Director of the centre.

The outstanding quality of research at the CCEM was highlighted when one of the images photographed with the confocal microscope was published on the cover of an international journal for yeast research (*Federation of European Microbiological Societies (FEMS) Yeast Research 6*).

The centre was also honoured by a visit from Prof. George Lindsey, a researcher from the University of Cape Town (UCT), together with one of his Ph.D. students. They made use of the centre for the third consecutive year (2004-2006) for a confocal microscope research project.

Staff from the centre not only assisted researchers with their research and training outputs, they also presented a number of papers at the congress of the Microscope Society of Southern Africa held in Port Elizabeth in December 2006. Prof. Van Wyk delivered a presentation at this congress, entitled: *Solving some yeast growth phenomena using confocal microscopy*. He received the Leica prize as the best confocal microscope presentation at the conference.

Ms Beanérlri Janecke presented a paper at the same congress entitled: *Creating a database for future identification of mammals from hair in leopard scats*. This is a project undertaken in collaboration with a M.Sc. student, Mr Jackson Chaka, from the Department of Animal, Wildlife and Grassland Sciences at the UFS.

Academic staff

Associate Professor: Prof. Pieter van Wyk

Research Officer: Ms Beanérlri Janecke

Contact details

Prof. Pieter van Wyk
Centre for Confocal and Electron
Microscopy
University of the Free State
PO Box 339
Bloemfontein
South Africa
9300

Telephone: +27 51 401 2264
Fax: +27 51 444 5945
E-mail: vanwykpw.sci@ufs.ac.za
Website: www.ufs.ac.za

Research outputs

Publications

- Bareetseng, A.S., Kock, J.L.F., Pohl, C.H., Pretorius, E.E. & Van Wyk, P.W.J. 2005. Uncovering the first double brimmed hat-shaped ascospores in *Ambrosiozyma platypodis* Van der Walt. *Antonie van Leeuwenhoek International Journal of General and Molecular Microbiology* 87: 169-170.
- Bareetseng, A.S., Kock, J.L.F., Pohl, C.H., Pretorius, E.E., Botes, P.J., Van Wyk, P.W.J. & Nigam, S. 2005. The presence of 3-hydroxy oxylipins on surfaces of hat-shaped ascospores of *Ascoidea africana* Batra & Francke-Grosman. *Canadian Journal of Microbiology* 51(1): 99-103.
- Bareetseng, A.S., Kock, J.L.F., Pohl, C.H., Pretorius, E.E., Strauss, C.J., Botes, P.J., Van Wyk, P.W.J. & Nigam, S. 2005. Mapping the distribution of 3-hydroxy oxylipins in the ascomycetous yeast *Saturnispora saitoi*. *Systematic and Applied Microbiology* 29: 446-449.
- Basson, L. & Van As, J.G. 2005. Protozoan fish parasites and their implication in aquaculture in the Okavango Delta, Botswana. *Journal of the South Veterinary Association* 76(3): 173.
- Guduri, B.R. & Luyt, A.S. 2006. Mechanical and morphological properties of carbon fiber reinforced-modified epoxy composites. *Journal of Applied Polymer Science* 101: 3529-3536.
- Haddad, C.R. 2006. A new species of *Corinnomma* (Araneae: Corinnidae) from Southern and Eastern Africa, with taxonomic notes on *C. olivaceum* and *C. semiglabrum*. *African Invertebrates* 47: 71-83.
- Haddad, C.R. 2006. *Spinotrachelas*, a new genus of tracheline sac spiders from South Africa (Araneae: Corinnidae). *African Invertebrates* 47: 85-93.
- Jansen van Rensburg, C., King, P.H. & Van As, J.G. 2005. Is parasite diversity an indication of host niche adaptation? *Journal of the South Veterinary Association* 76(3): 176.
- Jansen van Rensburg, C., King, P.H. & Van As, J.G. 2006. The Okavango Delta: A haven for digenean parasites. *Journal of the South African Veterinary Association* 77(2): 95.
- Leeuw, N.J., Kock, J.L.F., Pohl, C.H., Bareetseng, A.S., Sebolai, O.M., Joseph, M., Strauss, C.J., Botes, P.J., Van Wyk, P.W.J. & Nigam, S. 2006. Oxylipin covered ascospores of *Eremothecium coryli*. *Antonie van Leeuwenhoek International Journal of General and Molecular Microbiology* 89(1): 91-97.
- Lyle, R. & Haddad, C.R. 2006. A revision of the Afrotropical tracheline sac spider genus *Thysanina* Simon, 1910 (Araneae: Corinnidae). *African Invertebrates* 47: 95-116.
- Ncango, D.M., Pohl, C.H., Sebolai, O.M., Botes, P.J., Strauss, C.J., Joseph, M., Van Wyk, P.W.J., Nigam, S. & Kock, J.L.F. 2006. Oxylipin-coated hat-shaped ascospores of *Ascoidea corymbosa*. *Canadian Journal of Microbiology* 52: 1-5.
- Pohl, C.H., Kock, J.L.F., Van Wyk, P.W.J. & Albertyn, J. 2006. *Cryptococcus anemochoreius* sp. nov., a novel anamorphic basidiomycetous yeast isolated from the atmosphere in central South Africa. *International Journal of Systematic and Evolutionary Microbiology* 56: 2703-2706.
- Salemane, M.G. & Luyt, A.S. 2006. Thermal and mechanical properties of polypropylene-wood powder composites. *Journal of Applied Polymer Science* 100: 4173-4180.
- Sebolai, O.M., Kock, J.L.F., Pohl, C.H., Botes, P.J., Strauss, C.J., Van Wyk, P.W.J. & Nigam, S. 2005. The presence of 3-hydroxy oxylipins on the ascospore surfaces of some species representing *Saccharomycopsis* Schionning. *Canadian Journal of Microbiology* 51(7): 605-612.
- Smit, N.J., Van As, L.L. & Van As, J.G. 2005. Redescription of *Argulus multipocula* Barnard, 1955 (Crustacea: Branchiura) collected on the west coast of South Africa. *Systematic Parasitology* 60: 75-80.
- Sreekumari, N.P., Radhakrishnan, T., Revaprasadu, N., Kolawole, G.A., Luyt, A.S. & Djokovic, V. 2005. Structure and characterization of polystyrene films containing PbS nanoparticles. *Journal of Materials Science* 40(16): 4407-4409.
- Sreekumari, N.P., Radhakrishnan, T., Revaprasadu, N., Kolawole, G.A., Luyt, A.S. & Djokovic, V. 2005. Structure and properties of PbS-polyacrylamide nanocomposites. *Applied Physics* 81: 835-838.
- Strauss, C.J., Kock, J.L.F., Van Wyk, P.W.J., Lodolo, E.J., Pohl, C.H. & Botes, P.J. 2005. Bioactive oxylipins in *Saccharomyces cerevisiae*. *Journal of the Institute Brewing* 111(3): 304-308.
- Strauss, C.J., Van Wyk, P.W.J., Lodolo, E.J., Botes, P.J., Pohl, C.H., Nigam, S. & Kock, J.L.F. 2006. Oxylipin associated co-flocculation in yeasts. *Journal of the Institute of Brewing* 112(1): 66-71.
- Van AS, L.L. & Van As, J.G. 2005. Reproductive strategies of branchiurans. *Journal of the South Veterinary Association* 76(3): 179.
- Van Heerden, A., Kock, J.L.F., Botes, P.J., Pohl, C.H., Strauss, C.J., Van Wyk, P.W.J. & Nigam, S. 2005. Ascospore release from bottle-shaped ascus in *Dipodascus albidus*. *FEMS Yeast Research* 5: 1185-1190.
- Van Heerden, A., Van Wyk, P.W.J., Botes, P.J., Pohl, C.H., Strauss, C.J., Nigam, S. & Kock, J.L.F. 2006. The release of elongated, sheathed ascospores from bottle-shaped ascus in *Dipodascus geniculatus*. Accepted for publication in *FEMS Yeast Research*.
- Venter, H.J.T., Dold, A.P., Verhoeven, R.L. & Ionta, G. 2006. *Kappia lobulata* (Apocynaceae, Periplocoideae), a new genus from South Africa. *South African Journal of Botany* 72: 529-533.
- Venter, H.J.T., Thulin, M. & Verhoeven, R.L. 2006. Two new species of *Cryptolepis* (Apocynaceae: Periplocoideae) from Somalia, North-east Africa. *South African Journal of Botany* 72: 139-143.
- ### Chapters in books
- Basson, L. & Van As, J.G. 2006. *Trichodinidae* and other ciliophorans (Phylum Ciliophora). In *Fish Diseases and Disorders, Volume 1L, Protozoan and Metazoan Infections* (2nd edition), edited by P.T.K. Wood. Oxfordshire, UK: CABI Publishing. pp. 154-182.
- ### Conference contributions
- Basson, L. & Van As, J.G. 2006. *Effect of water levels on parasite infestations in the Okavango Delta, Botswana*. Paper presented at the 35th Congress of the Parasitological Society of Southern Africa, Windhoek, Namibia.
- Brink, S., Van der Linde, T.C., Basson, L. & Van Wyk, P.W.J. 2005. *Differentiation of the third instar larvae of certain forensically important flies based on the cephalopharyngeal skeleton and the posterior spiracles*. Poster presented at the 15th Congress of the Entomological Society of Southern Africa, Grahamstown, South Africa.
- Dhlamini, M.S., Terblans, J.J., Ntwaeaborwa, O.M. & Swart, H.C. 2006. *Synthesis and degradation of the PbS nanoparticle phosphors embedded in SiO₂ (SiO₂:PbS)*. Poster presented at the Asian Pacific Conference on Surface Science and Engineering, Hong Kong, China.
- Goldblatt, M.E., Botes, P.J., Van Wyk, P.W.J., Strauss, C.J., Nigam, S., Pohl, C.H. & Kock, J.L.F. 2006. *Phenotypic variation in oxylipin-producing Dipodascopsis uninucleata*. Paper presented at the 2nd International Conference on Non-mammalian Eicosanoids, Bioactive Lipids and Plant Oxylipins, Berlin, Germany.
- Goldblatt, M.E., Botes, P.J., Van Wyk, P.W.J., Strauss, C.J., Nigam, S., Pohl, C.H. & Kock, J.L.F. 2006. *Phenotypic variation in oxylipin-producing Dipodascopsis uninucleata*. Paper presented at the 14th Biennial Congress of the South African Society for Microbiology, Pretoria, South Africa.
- Guduri, B.R., Luyt, A.S. & Krupa, I. 2006. *Shape stabilized phase change materials based on low density polyethylene and paraffin waxes*. Paper presented at the UNESCO/IUPAC Conference on Macromolecules, Stellenbosch, South Africa.
- Haddad, C.R. & Boosselaers, J. 2005. *The past, present and future of systematic and ecological research on Afrotropical ant-like sac spiders (Araneae: Corinnidae)*. Poster presented at the 15th Congress of the Entomological Society of Southern Africa, Grahamstown, South Africa.
- Jansen van Rensburg, C., King, P.H. & Van As, J.G. 2006. *The Okavango Delta: A haven for digenean parasites*. Paper presented at the 34th Annual Congress of the Parasitological Society of Southern Africa, Magoebaskloof, South Africa.
- Kock, J.L.F., Strauss, C.J., Pohl, C.H., Van Wyk, P.W.J. & Botes, P.J. 2006. *Yeast biomechanics*. Proceedings of the 3rd European Conference on Computational Mechanics Solids, Structures and Coupled Problems in Engineering, Lisbon, Portugal. Edited by C.A. Mota Soares, J.A.C. Martins, J.A.C. Ambrosio, C.A.B. Pina, C.M. Mota Soares, E.B.R. Periera & J. Folgado. p. 725.
- Kock, J.L.F., Strauss, C.J., Pohl, C.H., Van Wyk, P.W.J. & Nigam, S. 2006. *Message in a bottle*. Paper presented at the 2nd International Conference on Non-mammalian Eicosanoids, Bioactive Lipids and Plant Oxylipins, Berlin, Germany.
- Leeuw, N.J., Pohl, C.H., Bareetseng, A.S., Sebolai, O.M., Joseph, M., Strauss, C.J., Botes, P.J., Van Wyk, P.W.J., Nigam, S. & Kock, J.L.F. 2006. *The function of spindle-shaped ascospores in Eremothecium coryli*. Poster presented at the 14th Biennial Congress of the South African Society for Microbiology, Pretoria, South Africa.
- Leeuw, N.J., Pohl, C.H., Bareetseng, A.S., Sebolai, O.M., Joseph, M., Strauss, C.J., Botes, P.J., Van Wyk, P.W.J., Nigam, S. & Kock, J.L.F. 2006. *Oxylipin covered ascospores of Eremothecium coryli*. Paper presented at the 2nd

- International Conference on Non-mammalian Eicosanoids, Bioactive Lipids and Plant Oxylipins, Berlin, Germany.
- Lyle, R. & Haddad, C.R.** 2005. *Tracheline sac spiders of the Afro-tropical region, with a revision of the genus Thysanina Simon, 1910 (Araneae: Corinnidae)*. Poster presented at the 15th Congress of the Entomological Society of Southern Africa, Grahamstown, South Africa.
- Mishra, A.K., Mishra, S.B. & Luyt, A.S.** 2006. *Low density polyethylene-wood fibre-silica nanocomposites: Thermal and mechanical properties*. Paper presented as poster at the UNESCO/IUPAC Conference on Macromolecules, Stellenbosch, South Africa.
- Mishra, S.B. & Luyt, A.S.** 2006. *EVA-clay nanocomposites: Thermal and mechanical properties*. Paper presented as poster at the UNESCO/IUPAC Conference on Macromolecules, Stellenbosch, South Africa.
- Motaung, T.E., Mishra, S.B. & Luyt, A.S.** 2006. *Thermal and mechanical properties of LDPE-g-MAH-silica nanocomposites*. Paper presented as poster at the UNESCO/IUPAC Conference on Macromolecules, Stellenbosch, South Africa.
- Ncango, M.D., Pohl, C.H., Sebolai, O.M., Botes, P.J., Strauss, C.J., Joseph, M., Van Wyk, P.W.J., Nigam, S. & Kock, J.L.F.** 2006. *Forced release of hat-shaped ascospores in Ascoidea corymbosa*. Poster presented at the 2nd International Conference on Non-mammalian Eicosanoids, Bioactive Lipids and Plant Oxylipins, Berlin, Germany.
- Ncango, M.D., Pohl, C.H., Sebolai, O.M., Botes, P.J., Strauss, C.J., Joseph, M., Van Wyk, P.W.J., Nigam, S. & Kock, J.L.F.** 2006. *Forced release of hat-shaped ascospores in Ascoidea corymbosa*. Poster presented at the 14th Biennial Congress of the South African Society for Microbiology, Pretoria, South Africa.
- Pohl, C.H., Strauss, C.J., Van Wyk, P.W.J. & Kock, J.L.F.** 2006. *Yeast "nanobots"*. Paper presented at the 3rd European Conference on Computational Mechanics Solids, Structures and Coupled Problems in Engineering, Lisbon, Portugal.
- Strauss, C.J., Kock, J.L.F., Van Wyk, P.W.J., Botes, P.J. & Nigam, S.** 2006. *Inverse flocculation in Saccharomyces cerevisiae*. Paper presented at the 2nd International Conference on Non-mammalian Eicosanoids, Bioactive Lipids and Plant Oxylipins, Berlin, Germany.
- Strauss, C.J., Kock, J.L.F., Van Wyk, P.W.J., Lodolo, E.J., Botes, P.J. & Nigam, S.** 2005. *Cell walls and yeast flocculation: The role of oxylipins*. Paper presented at the 24th International Specialized Symposium on Yeasts, Castellon, Spain.
- Swart, C.W., Botes, P.J., Van Wyk, P.W.J., Strauss, C.J., Nigam, S., Pohl, C.H. & Kock, J.L.F.** 2006. *3-Hydroxy oxylipins associated with Candida magnolia*. Poster presented at the 2nd International Conference on Non-mammalian Eicosanoids, Bioactive Lipids and Plant Oxylipins, Berlin, Germany.
- Swart, C.W., Botes, P.J., Van Wyk, P.W.J., Strauss, C.J., Nigam, S., Pohl, C.H. & Kock, J.L.F.** 2006. *3-OH oxylipins associated with Candida magnolia*. Poster presented at the 14th Biennial Congress of the South African Society for Microbiology, Pretoria, South Africa.
- Van Heerden, A., Strauss, C.J., Pohl, C.H., Van Wyk, P.W.J., Nigam, S. & Kock, J.L.F.** 2006. *Message in a bottle*. Poster presented at the 14th Biennial Congress of the South African Society for Microbiology, Pretoria, South Africa.
- Van Heerden, A., Strauss, C.J., Pohl, C.H., Van Wyk, P.W.J., Nigam, S. & Kock, J.L.F.** 2006. *Yeast Biomechanics: Message in a bottle*. Poster presented at the 2nd International Conference on Non-mammalian Eicosanoids, Bioactive Lipids and Plant Oxylipins, Berlin, Germany.
- Van Marwijk, J., Van Heerden, E., Piater, L.A. & Gericke, M.** 2006. *Biological synthesis of gold nanoparticles*. Paper presented at the Gold 2006: 4th International Conference on Gold Science, Technology and Its Applications, Limerick, Ireland.
- Van Wyk, P.W.J., Kock, J.L.F., Van Heerden, A., Strauss, C.J., Pohl, C.H., Schoombie, S.W. & Nigam, S.** 2005. *Macro-messages in a micro-bottle*. Proceedings of the 44th Annual Conference of the Microscopy Society of Southern Africa, University of KwaZulu-Natal, Pietermaritzburg, South Africa. pp. 35-36.
- Van Wyk, P.W.J., Strauss, C.J., Kock, J.L.F. & Nigam, S.** 2006. *Application of electron and confocal laser scanning microscopy in observing oxylipins in fungal cells*. Paper presented at the 2nd International Conference on Non-mammalian Eicosanoids, Bioactive Lipids and Plant Oxylipins, Berlin, Germany.
- Verhoeven, R.L.** 2005. *Phylogenetic development in Apocynaceae*. Paper presented at the 31st Annual Congress of the South African Association of Botanists, University of the Free State, Bloemfontein, South Africa.

Statistical data of the faculty



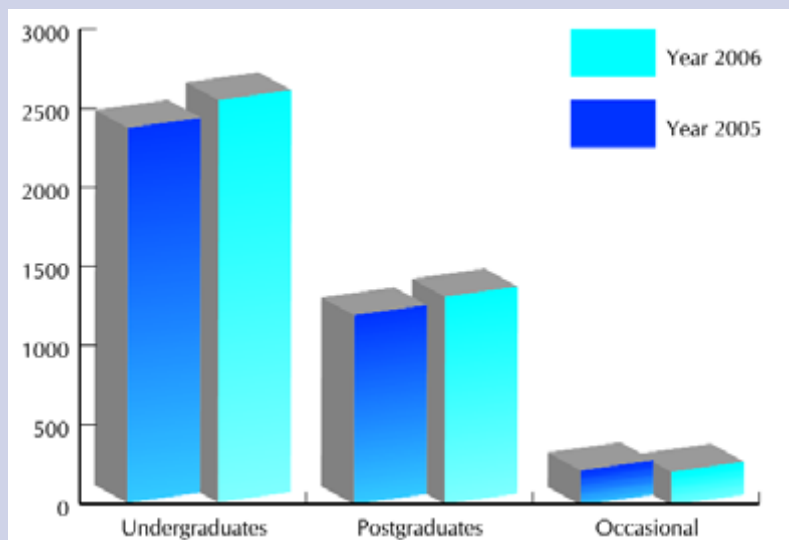
Student figures

Faculty of Natural and Agricultural Sciences, 2005/06

Male					
2005					
Description	African	Coloured	Indian	White	Total
Undergraduate	676	31	26	724	1457
Postgraduate	351	22	15	400	788
Occasional	84	3	4	17	108
Total 2005	1111	56	45	1141	2353
2006					
Description	African	Coloured	Indian	White	Total
Undergraduate	729	28	21	768	1546
Postgraduate	385	21	16	431	853
Occasional	68	2	2	23	95
Total 2006	1182	51	39	1222	2494

Female					
2005					
Description	African	Coloured	Indian	White	Total
Undergraduate	563	41	11	394	1009
Postgraduate	206	16	11	221	454
Occasional	101	5	2	11	119
Total 2005	870	62	24	626	1582
2006					
Description	African	Coloured	Indian	White	Total
Undergraduate	641	39	17	401	1098
Postgraduate	243	15	17	234	509
Occasional	103	2	2	16	123
Total 2006	987	56	36	651	1730

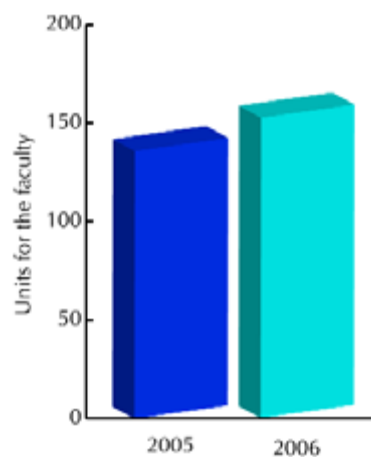
Total					
2005					
Description	African	Coloured	Indian	White	Total
Undergraduate	1239	72	37	1118	2466
Postgraduate	557	38	26	621	1242
Occasional	185	8	6	28	227
Total 2005	1981	118	69	1767	3935
2006					
Description	African	Coloured	Indian	White	Total
Undergraduate	1370	67	38	1169	2644
Postgraduate	628	36	33	665	1362
Occasional	171	4	4	39	218
Total 2006	2169	107	75	1873	4224



Student figures

Student nationality		
Nationality	2005	2006
Angola	1	
Asian countries	21	18
Botswana	20	20
European countries	6	6
Lesotho	142	142
Malawi	2	1
Mauritius		2
Mozambique	8	7
Namibia	40	42
No information	1	
North America	4	4
Other Africa	45	48
South Africa	3610	3893
South America		1
Swaziland	13	13
Zambia	4	6
Zimbabwe	18	21
Total	3935	4224

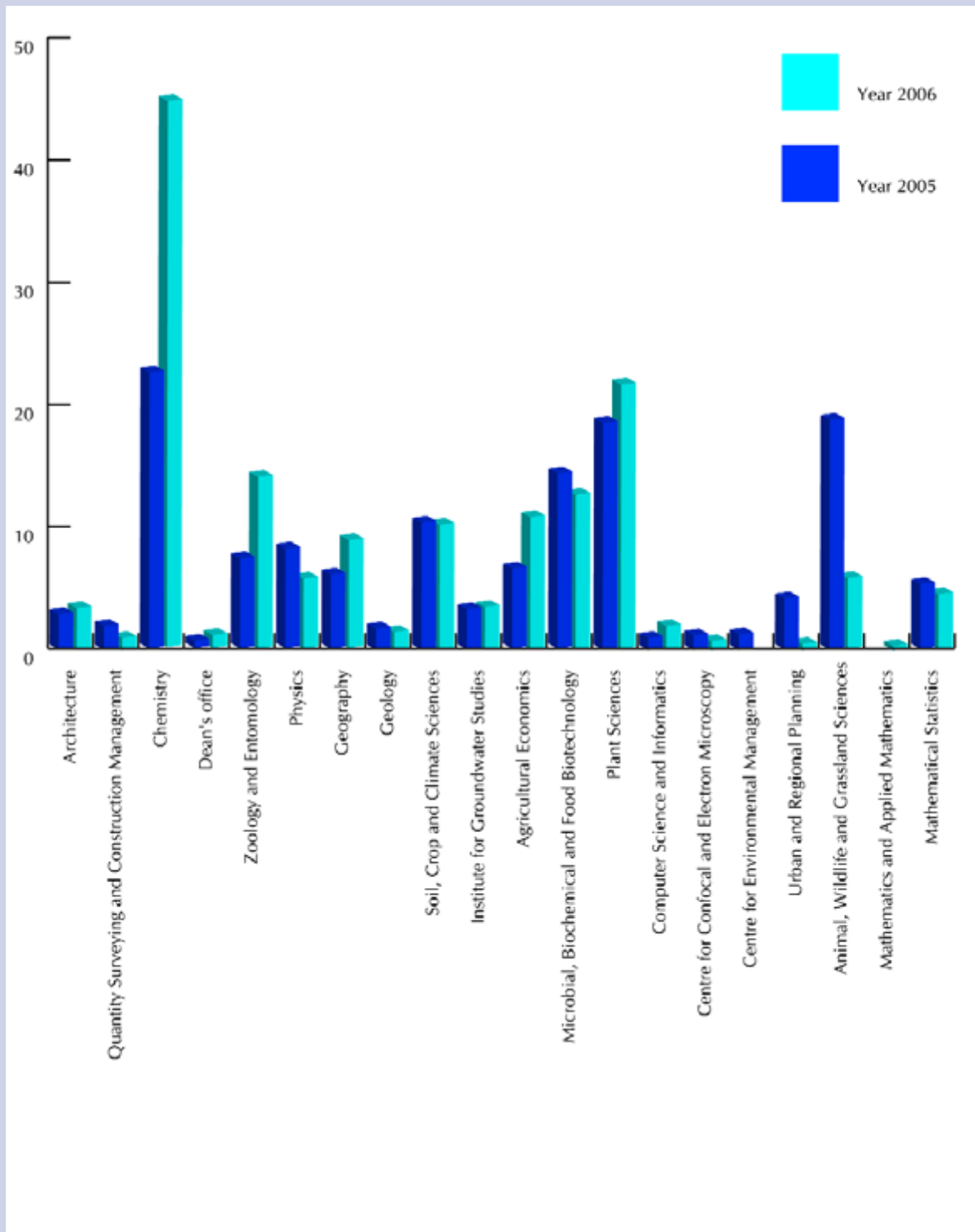
Research outputs for the Faculty of Natural and Agricultural Sciences



Articles published in accredited approved research journals.

Departmental research outputs

Articles published in accredited approved research journals, 2005/06



Glossary



Glossary

A

ACIAR	Australian Centre for International Agricultural Research
AEASA	Agricultural Economics Association of South Africa
ALPRU	African Large Predator Research Unit
ARC	Agricultural Research Council
ARMSCOR	Armaments Corporation of South Africa
ARS	Agri Risk Specialists
ASAQS	Association of South African Quantity Surveyors
ASSA	Anatomical Society of South Africa
ASTER	Advanced Spaceborne Thermal Emission and Reflection Radiometer
AVS	American Vacuum Society

C

CANSA	Cancer Association of South Africa
CATSA	Catalysis Society of South Africa
CBD	Convention of Biological Diversity
CCEM	Centre for Confocal and Electron Microscopy
CePHMa	Centre for Plant Health Management
CfPB	Centre for People and Buildings
CIAT	International Centre for Tropical Agriculture
CIDB	Construction Industry Development Board
CIMMYT	International Maize and Wheat Improvement Centre
CIOB	Chartered Institute of Building
CIOB-SA	Chartered Institute of Building - South Africa
CSACEE	Central South African Council on Economic Education
CSIC-INTA	Centro de Astrobiología
CSIR	Council for Scientific and Industrial Research
CSIRO	Commonwealth Scientific and Industrial Research Organisation

D

DEAT	Department of Environmental Affairs and Tourism
DiMTEC	Disaster Management Training and Education Centre for Africa
DMISA	Disaster Management Institute of South Africa
DST	Department of Science and Technology

E

EAAP	European Association for Animal Production
EASA	Education Association of South Africa
ECA	European Crystallographic Association
EIGG	Environmental Inorganic Geochemistry Group
EPWP	Expanded Public Works Programme
ESBES	European Symposium on Biochemical Engineering Science
ESREL	European Safety and Reliability
ESRP	Economic and Social Rehabilitation Programme

F

FAO	Food and Agriculture Organisation
FEMS	Federation of European Microbiological Societies
FMP	Facilities Management Programme
FOTIM	Foundation of Tertiary Institutions of the Northern Metropolis

FSRPO

Free State Red Meat Producers Organisation

G

GIS	Geographical Information Systems
Glen ADI	Glen Agricultural Development Institute
GM	Genetically Modified
GMBA	Gauteng Master Builders' Association
GMO	Genetically Modified Organisms
GWK	Griekwaland-Wes Koöperasie

H

HIV	Human Immunodeficiency Virus
HPCSA	Health Professions Council of South Africa
HPLC	High Performance Liquid Chromatography
HSPCM	Health and Safety Programme for Construction Managers

I

IAGOD	International Association on the Genesis of Ore Deposits
IAH	International Association of Hydrogeologists
ICCC	International Conference on Coordination Chemistry
ICEC	International Cost Engineering Council
ICID	International Commission on Irrigation and Drainage
ICP	Inductively Coupled Plasma
ICRBM	International Conference on Rodent Biology and Management
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
IDC	Industrial Development Corporation
IGS	Institute for Groundwater Studies
IITA	International Institute of Tropical Agriculture
INCRoP	Insects on New Crops Programme
INTSORMIL	International Sorghum and Millet Research Support Programme

IPMA

International Project Management Association

IPMP

Intensive Project Management Programme

IRDP

Institutional Research and Development Programme

IRWH

In-field Rainwater Harvesting

IUCr

International Union of Crystallography

IUMS

International Union of Microbial Societies

IUPAP

International Union of Pure and Applied Physics

J

JFM	Journal of Facilities Management
-----	----------------------------------

L

LExEn	Life in Extreme Environments
-------	------------------------------

M

MIRCHEN	Microbiological Resources Centre
MIT	Massachusetts Institute of Technology
MRM	Mineral Resource Management
MSA	Master's Degree in Sustainable Agriculture
MSSA	Microscopy Society of Southern Africa
MUCPP	Mangaung University Community Partnership Programme
MURP	Master's Degree in Urban and Regional Planning

N

NaCOF	National Climate Outlook Forum
NAFU	National African Farmers Union
NAMC	National Agricultural Marketing Council
NASA	National Aeronautics and Space Administration
NASSP	National Astrophysics and Space Science Programme
NCEE	National Council for Economic Education
NDA	National Department of Agriculture
NECSA	National Energy Commission of South Africa
NELSAM	Natural Earthquake Laboratory in South African Mines
NERPO	National Emergent Red Meat Producers' Organisation
NGO	Non-Governmental Organisation
NML	National Metrological Laboratory
NMMU	Nelson Mandela Metropolitan University
NMR	Nuclear Magnetic Resonance
NRF	National Research Foundation
NUFU	Norwegian Council of Universities Committee for Development, Research and Education
NWGA	National Wool Growers' Association

O

OABS	Optimal Agricultural Business Solutions
OECD	Organisation for Economic Co-operation and Development

P

PARSA	Parasitological Association of Southern Africa
PDMIW	Processing and Disposal of Mineral Industry Wastes
POT	Peaks over Threshold
PPP	Public Private Partnership
PRT	Protein Research Trust

R

RICS	Royal Institute of Chartered Surveyors
RIEP	Research Institute of Education Planning
RNA	Research Niche Area
RPO	Red Meat Producers' Organisation

S

SA	South Africa
SAACE	South African Association of Consulting Engineers
SAB	The South African Breweries Limited
SACI	South African Chemical Institute
SACPCMP	South African Council for the Project and Construction Management Profession
SACPVP	South African Council for the Property Valuation Profession
SACQSP	South African Council for the Quantity Surveying Profession
SADC	Southern African Development Community
SAFMA	South African Facilities Management Association
SAFOI	South African Fryer Oil Initiative
SAIP	South African Institute of Physics
SAISC	Southern African Institute of Steel Construction
SAMSI	Statistical and Applied Mathematical Sciences Institute

SANCIAHS	South African National Committee for the International Association of Hydrological Sciences	SEDA	Small Enterprise Development Agency	UNEP	United Nations Environment Programme
SANCU	South African National Consumer Union	SMME	Small, Medium and Micro Enterprises	UNESCO	United Nations Educational, Scientific and Cultural Organisation
SANPAD	South Africa-Netherlands Research Programme on Alternatives in Development	SRC	Student Representative Council	USA	United States of America
SAPOA	South African Property Owners' Association	SRL	Sustainable Rural Livelihood	USAID	United States Agency for International Development
SAPS	South African Police Services	SSAG	Society of South African Geographers	UTCHEM	University of Texas Chemical Compositional Simulator
SAQA	South African Qualifications Authority	T		UWC	University of the Western Cape
SASAS	South African Society for Animal Science	THRIP	South African National Research Foundation Thrust for Industry-Related Projects	W	
SASQUA	Southern African Society for Quaternary Research	TUE	Technical University Eindhoven	WARFSA	Water Research Fund of Southern Africa
SAVAH	South African Association of Visual Arts Historians	U		WATOC	World Association of Theoretically Orientated Chemists
SBE	Sustainable Built Environments	UCT	University of Cape Town	WFP	World Food Programme
		UFS	University of the Free State	WITS	University of the Witwatersrand
		UJ	University of Johannesburg	WRC	Water Research Commission
		UK	United Kingdom	WUA	Water Users' Association
		UN	United Nations		