SASBMB News

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June 2004

SASBMB XIX th Conference

16-20 Jan 2005

Molecules-R-US

Host: Dept. Biochemistry
Venue: Univ. Stellenbosch
Main campus

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Contact email: moleculesrus@sun.ac.za

President's Message

Introduction

I would like to start by thanking Professor Stephanie Burton for the very professional standard that she set as President of the SASBMB for the period 2001-2003. Consequently we have not let her go, and she has been co-opted onto the new Council as Honorary Treasurer. Thank-you also, to Dr Graeme Bradley for putting together the SASBMB Newsletter; the newsletter is a vital medium for communication between SASBMB members. Professor Burton, with the help of the outgoing council, has initiated a number of activities and structures that will enable the society to operate such that its members derive benefit. My vision, as the incoming President, is to continue with these initiatives, but in particular to encourage the involvement of our student members so that they can derive maximum benefit from their association with the society. Therefore, I encourage all student members to take note of the following:

1. The SASBMB student database currently being established by the student Council members.
2. IUBMB travel awards and the FEBS-IUBMB Conference in July 2005.
3. The SASBMB travel awards, and the SASBMB Conference in January 2005.
4. The Wood-Whelan Research Fellowship for research visits and/or training: http://www.iubmb.org/Standing_Orders/Guidelines/Guidelines_Wood.htm

The new Council of the SASBMB was established in July 2003 during the SASBMB Conference in Pretoria, and will operate until the next SASBMB Conference in January 2005. The Council comprises 10 members from the discipline, two student members and three co-opted members, and is representative of a number of the major regions in

South Africa (Western Cape, Eastern Cape, Freestate, Gauteng, KwaZulu-Natal and the Northern Province):

SASBMB Council for the period 2003-2005:
President:
Greg Blatch (RU; G.Blatch@ru.ac.za)

Vice-President:
Don Cowan (UWC; dcowan@uwc.ac.za)

Secretary:
Fourie Joubert (UP; fjoubert@postino.up.ac.za)

Newsletter:
Graeme Bradley (RU; g.bradley@ru.ac.za)

Members:
Edith Elliot (UNP; elliot@ukzn.ac.za)
Anabella Gaspar (UP; anabella.gaspar@bioagric.up.ac.za)
Janet Hapgood (US; jhap@sun.ac.za)
Denver Hendricks (UCT Med School; hendricd@curie.uct.ac.za)
Les Mampuru (UNIN; leseilanem@unorth.ac.za)
Bethuel Nthangeni (UOFS; nthangmb.sci@mail.uovs.ac.za

Student Members:
Nyaradzo Chigorimbo-Tsikiwa (UCT; nyaradzo@chemeng.uct.ac.za)
Petra Gentz (RU; g95g5435@campus.ru.ac.za)

Co-opted:
Honorary Treasurer:
Stephanie Burton (UCT; sburton@chemeng.uct.ac.za)
Members:
Iqbal Parker (UCT Medical School; mparker@curie.uct.ac.za)
Nhlanhla Msomi (CEO, ECoBio; msomi@nu.ac.za)

It may be useful to know, particularly for newer members, that the SASBMB has approximately 500 members drawn from academics and students associated with universities, research institutions and industry. The SASBMB membership also overlaps with the membership of other South African scientific societies such as those representing Microbiology (SASM), Biotechnology (Biotech SA), and Plant Pathology (SASPP). The membership of the Experimental Biology Group of the Western Cape (EBG) is affiliated to the SASBMB. The SASBMB membership is therefore interacting and communicating actively with other societies within South Africa.

International Activities

During 2003, Professor Blatch and Professor Parker attended the HUPO 2nd Annual & IUBMB XIX World Congress, Montreal, Canada, 8-11 October 2003, and represented SASBMB at the IUBMB General Assembly on 12 October. At the General assembly, Professor Parker was elected to the IUBMB Nominations Committee, an important position that means that for the first time Africa will have an influence on the process of nominations to the Executive Committee of the IUBMB. Professor Parker also held (until end of 2003) the position of Secretary General of the Federation of African Societies of Biochemistry and Molecular Biology (FASBMB), and he represents FASBMB on the IUBMB Executive Committee.

The IUBMB meeting was due to be held in Toronto at the end of July, however, the advent of SARS precipitated the marriage of HUPO and IUBMB in October. The combined programme constructed by Mike Walsh (University of Calgary, Canada), Chair of the IUBMB Scientific Programme and John Bergeron (McGill University, Canada), Congress Chairman and Chair HUPO Scientific Programme, was excellent and offered something for everyone with an interest in biochemistry, molecular biology or proteomics. The opening session was marked by a thought-provoking keynote address by the 2002 Chemistry Nobel Prize winner, John Fenn. The congress was characterized by many quality

talks on recent advances in the storage and analysis of high throughput data, in particular high throughput structural data, signal transduction data and protein-protein interaction networks. Charles Boone (University of Toronto, Canada) presented a comprehensive plenary lecture on a genome wide approach to identifying functional relationships using synthetic lethality in yeast. He and others are now involved in large-scale mapping of genetic networks with the aim of elaborating and validating protein-protein networks. Akhilesh Pandey (John Hopkins University, Baltimore, USA) provocatively stated that he is skeptical of the quality of most protein-protein network data on the web that has not been validated by the peer-review process. He has been driving the establishment of a "Human Protein Reference Database" (www.hprd.org) that is based on published data, is non-redundant and is manually curated. The educational component of the meeting included interesting presentations by Robert Learmonth (University of Southern Queensland, Toowoomba, Australia) and Ellis Bell (University of Richmond, Richmond, USA). Robert Learmonth outlined a focused biochemistry programme that covered all aspects of modern biochemistry using metabolism as a central theme. Ellis Bell started his presentation with "one can be no better a teacher than one is a learner" and went on to state, "don't teach biochemistry, teach the student". He made the excellent point that biochemists should be teaching basic skills more than facts, the fundamental and quantitative basis of biochemistry, and using research as a teaching tool within a teaching environment that encourages and enables students to take responsibility for their education. One of the most impressive features of the HUPO-IUBMB congress was the Young Scientists Programme organized by Fred Palmer (Dalhousie University, Canada). Over 700 young scientists submitted abstracts for this programme from over 68 countries. South Africa was well represented by Dr OO (Tayo) Odunuga (UCT), Ms Christine Maritz (UP), and Dr Collett Dandara (UCT). Other representatives from Africa included Mr David Menge (Kenya).

Continental Activities

The FASBMB Congress held in Yaounde, Cameroon, 25–28 November 2003, was attended by Professor Parker as the Secretary General of FASBMB, Prof Dirk Bellstedt (Stellenbosch) as the official SASBMB delegate, and Dr Hendricks as an additional SASBMB representative. They each gave oral presentations and made important contacts with scientist from the African continent. The FASBMB Council meeting was held on 24 November 2003, at which the business of the FASBMB was discussed and the new office bearers were elected. Prof Parker was elected as the Treasurer of the FASBMB Executive Committee. The SASBMB Council plans to increase its role in FASBMB activities.

National and Provincial Activities

The 18th SASBMB Conference was held during 6-9 July 2003, Pretoria with the theme "Molecules of Life UP-North", and was a great success thanks to the organizers, the University of the North (Co-chair: Professor R Becker) and the University of Pretoria (Co-chair: Professor AI Louw). The conference attracted a considerable number of students, with 232 delegates in total. A number of international delegates presented keynote talks with the SASBMB sponsoring Dr M Cheetham (UCL, UK). The SASBMB/Beckman-Coulter Gold and Silver Medal Awards were presented to Prof J-H Hofmeyr (US) and Prof J Rohwer (US), respectively, who both gave excellent presentations on their research. The SASBMB Honours Award was presented to Ms M Roux (RAU).

In addition to the 18th SASBMB Conference, during 2003 the following activities were also organized and funded through the SASBMB:

1. Eastern Cape Symposium, 4 December.
2. EBG Annual Prize for the best student at a General Meeting.
3. Seed money to the Organizing Committee of the SASBMB Conference planned for January 2005.

The Eastern Cape Symposium attracted over 40 participants from the University of Fort Hare, University of Port Elizabeth (UPE) and Rhodes University. There were 13 presentations by postgraduates from all participating institutions. The day ended with a keynote lecture by Professor Lazlo Graf, Eostov University, Budapest, Hungary who then presented the prizes for the best presentations awarded to Adele Thomas (PhD at UPE), Addmore Shonhai (MSc at Rhodes University) and Tunga Mafunga (MSc at Fort Hare University). The EBG hosted quarterly General Meetings as a platform for young scientists to present their work to an informed audience. In 2003 the SASBMB-sponsored prize for the best presentation at a General Meetings was awarded to Geeta Eick (PhD at UCT).

In addition to supporting discipline related activities, members of SASBMB Committee have been involved in workshops and forums coordinated by organizations involved in promoting science and technology in general. Professor D Cowan attended a National Science and Technology Forum (NSTF) workshop held on 29 October 2003. There were a number of keynote presentations by the Department of Science and Technology (DST) and the Department of Trade and Industry (DTI) on capacity building and the economy. There was also discussion about the establishment of a database for the storage of information about the professional progression of South African postgraduates. The SASBMB Council is considering being involved in the establishment of such a database. On 23 March 2004, Dr Gaspar attended an NSTF meeting for the SETAG sector (Scientific, Engineering and Technological Societies and Allied Professions Group of SA), at which SETAG was officially launched with the election of its Executive Committee and Internal Council.

SASBMB Student Database and SASBMB Student Travel Awards for 2004-2005

The SASBMB Council student members, Nyaradzo Chigorimbo-Tsikiwa and Petra Gentz, have been very busy setting up a SASBMB

student member's database. This database will be completed in 2004 and accessible through the society's webpage. The aim of this database is to facilitate the communication between students, and the tracking of the activities of our student members. I would like to encourage all student members and Heads of Departments to submit the names and contact details of student members to Nyradzo and Petra as soon as possible, so as to expedite the establishment of this database.

At the last meeting of the SASBMB Council (UWC, 29 January 2004) a postgraduate student travel bursary scheme was proposed and approved by the Council. This scheme will provide three bursaries of R5000 each as a contribution to travel to IUBMB-affiliated international conferences. The President, Vice-President and the student members of the SASBMB Council have been constituted as the Travel Awards Subcommittee, and we strongly encourage students to apply for this travel award by submitting a letter of motivation from their supervisor, conference details and CV to the President. Any other travel awards or grants must also be declared.

Finally, I would like to encourage all the members of SASBMB and the wider scientific community to provide the SASBMB Council with feedback about how we can better serve the community. All the best, especially to the students, for your research and teaching in 2004!

Professor Greg Blatch
President of SASBMB
Professor of Biochemistry
Department of Biochemistry, Microbiology & Biotechnology
Rhodes University
Grahamstown 6140
Tel: 046-603-8262; Fax: 046-622-3984; Email: G.Blatch@ru.ac.za

UNIVERSITY OF PRETORIA
DEPARTMENT OF BIOCHEMISTRY

Masters, PhD & Postdoctoral Opportunities

Funded positions are available for postgraduate students (NRF-Grant-holder linked bursaries) and a postdoctoral fellow (UP-Postdoctoral Fellowship) to conduct research in Proteomics and Peptidomics, within the Molecular Parasitology (Tick group) research team.

The primary focus of this research programme is to establish the proteome/peptidome patterns for various tick tissues known to play a role in innate immunity and to investigate how these patterns change with pathogen infection. Knowledge obtained from these studies will lead to the discovery of both novel antimicrobial peptides and protein antigens for vaccine development.

The successful postdoctoral candidate should have a strong background in biochemical and molecular biology techniques. Experience in proteomics and peptidomics is desirable, but not essential.

If you are interested in doing a higher degree or postdoctoral research, please contact

Dr Anabella Gaspar
Department of Biochemistry
University of Pretoria
Pretoria, 0002
South Africa
Tel: +27-12-420 2481
Fax: +27-12-362 5302
E-mail: anabella.gaspar@bioagric.up.ac.za

The University of KwaZulu-Natal is committed to employment equity and will give preference to appointable candidates from the designated groups.

PROFESSOR OF GENETICS
SCHOOL OF MOLECULAR &
CELLULAR BIOSCIENCES
PIETERMARITZBURG CAMPUS
REFERENCE NO.: P51/2004

The successful candidate will make a dynamic contribution to the leadership of the discipline of Genetics and will be expected to take on academic and administrative tasks within the School.

Minimum requirements:

- PhD;
- Five years lecturing experience at undergraduate and postgraduate levels;
- Training in the broad Discipline of Genetics;
- A research record evidencing publications, postgraduate student supervision and attraction of funds, that establishes the applicant as a scientist with an international reputation.
- Evidence of ability to perform a leading role in the academic and research programme.

All areas of genetics will be considered, but a research background in Bioinformatics will be a recommendation. South African candidates should preferably hold a current rating by the National Research Foundation.

The remuneration package includes benefits and will be dependent on the qualifications and experience of the successful applicant. The selection process will commence on 4 June 2004 and will continue until a suitable candidate is appointed or a decision is taken not to fill the post.

Applicants are required to submit a full CV, together with the name, telephone numbers, and fax no. or e-mail address of three referees, to Human Resources Administration, University of KwaZulu-Natal, Private Bag X01 Scottsville, 3209, Fax. No. +27 (0)33 260 5356 or e-mail Neld@ukzn.ac.za

The University of KwaZulu-Natal is committed to employment equity and will give preference to appointable candidates from the designated groups.

SENIOR LECTURER
MICROBIOLOGY
SCHOOL OF APPLIED ENVIRONMENTAL SCIENCES
PIETERMARITZBURG CAMPUS
REFERENCE NO.: P41/2004

The successful applicant will take an active role in teaching and training students in programmes in General, Industrial and Environmental Microbiology and Industrial Bioprocessing Technology. S/he will be expected to establish a vigorous research programme in microbiology and will supervise postgraduate students at the MSc and PhD levels. We are looking for a resourceful, self-motivated person committed to excellence in teaching and promoting microbiology as a discipline.

Minimum requirements:

- A PhD and prior training specifically in microbiology with specialisation in either industrial or environmental microbiology/biotechnology
- A breadth of knowledge and research interests in the broader areas of microbiology and biotechnology.
- Evidence of lecturing experience in various aspects of microbiology at both undergraduate and postgraduate levels.
- Experience in supervision of postgraduate students.
- Evidence of successful running of independent research programmes and publication of the findings as refereed journal publications.
- Evidence of obtaining external funding

In addition, the following would be considered advantageous:

- Established linkages with industry;
- Experience in curriculum development; and,
- Experience/expertise in teaching courses in fermentation technology.

The remuneration offered will be determined according to the qualifications and/or experience of the successful applicant. The process of selection will commence on 4 June 2004 and will cease only after the vacancy has been filled.

Applicants are required to submit a CV, together with full contact details of three referees, to Human Resources, University of KwaZulu-Natal, Private Bag X01, Scottsville, 3209. Fax. No. +27 (0)33 260 5356. Email Bhebhec@ukzn.ac.za

Regional Reports

MRC/US Centre for Molecular and Cellular Biology, Department of Medical Biochemistry, Faculty of Health Sciences, University of Stellenbosch

Reported by Valerie Corfield

It hardly seems possible that time has passed so quickly and that the call has gone out for contributions for the upcoming edition of the SASBMB newsletter. Initially, I was concerned that there couldn't possibly be that much news to report, but I donned my investigative reporter's belted raincoat and set out along the corridors of academia to ferret out the truth.

I needn't have worried; there is plenty of action to report. Let's start with the winner of the 2002 SASBMB/Beckmann silver medal, for her work on the molecular pathophysiology of the inherited heart disease hypertrophic cardiomyopathy (HCM), Dr Hanlie Moolman-Smook. In

the last month, Hanlie scooped two more prestigious awards, the first, a Wellcome Trust Senior Research Fellowship which reflects international recognition of outstanding ability and which will generously fund her work, on the genetic mechanisms that modify the expression of HCM, for five years. In addition, Hanlie has received the NRF President's award, which goes with a P rating- an acknowledgement of a young scientist of international and national standing. All this on top of the Wellcome Trusts renewal of her Collaborative Research Initiative Grant (CRIG) with the group of Prof Hugh Watkins at Oxford University, to understand the role of the sarcomeric protein, cardiac myosin binding protein C, in the development of HCM, and an NRF grant.

Professor Tommie Victor has also been rewarded for his consistently productive research into the molecular underpinnings of acquired antibiotic resistance in the pathogen *Mycobacterium tuberculosis*. Presently, he holds an NIH (USA) grant for collaborative epidemiological research with Prof Megan Murray at Harvard University, a Wellcome Trust CRIG with Prof Douglas Young at Imperial College, London to study multidrug resistant (MDR) TB. His group has followed serious outbreaks of MDR TB strains in the Western Cape, and identified an emerging MDR strain in the George area. PhD student, Ms Elizma Streicher, travelled to Guadelope, to the international TB fingerprinting database to follow-up on this work. He also holds an NRF grant and seeks to understand the dynamics of MDR TB outbreaks. These findings have brought not only scientific recognition (see accompanying illustration) but have found Tommie vying with Jodie Foster for front-page coverage (or uncoverage in the

case of Ms Foster). Reports in the popular press have helped to raise awareness among the public and health care workers.

The Centre has harvested additional funding to that mentioned above, with four other new NRF grants to PIs working on TB, continuing support from Glaxo-Smith-Kline for TB studies and from the Italian Ministry of Foreign Affairs, through Prof Peter Schwartz of the University of Pavia, with whom Profs Valerie Corfield and Paul Brink have collaborations for molecular and clinical research into the Long QT syndromes.

The Centre is still involved with scientific outreach programmes in Africa, spearheaded by Prof Victor through an initiative of the International Atomic Energy Agency (IAEA). The programme brings young scientists from African countries to receive training in the molecular tools used in research into infectious diseases. The success of this approach was evident with a recent publication from one of the Kenyan trainees in the International Journal of Tubercle and Lung Disease. The Centre has recently hosted visits of scientists from Zambia, Tanzania, Mozambique, Nigeria, Tunisia and, closer to home, the University of the North. While Ms Rabia Johnston traveled to Korea toYnsei University as part of the IAEA worldwide programme.

The department has also seen visiting scientists from Spain, Ms Ana Aquire via the London School of Hygiene and Tropical Medicine, and Dr Ralf Baumann, who joined us from the University of Berne, Switzerland while Mr Joel Djoba is a BSc Hons student from Gabon. Some of our students and scientists have been traveling too, Ms Chantal Babb's TB work took her to the Pasteur Institute for a short stay, while Mr Toy de Lange has gone to the University of Iowa to post doc (we hope that he will return briefly to graduate in December), Dr Samantha Sampson is still at Harvard and Dr Caroline Vernon is at the University of London. Mr Lester Meissenheimer is pursuing PhD studies in

Belgium, where he has learnt to like Belgium beer (though he says that was not too hard).

Prof Valerie Corfield remains as passionate as ever about science communication, and with increasing awareness from national and international funding bodies of the need to engage the public in an appreciation of science she expects to see more colleagues becoming involved. She received an award from the Public Understanding of Biotechnology (PUB) Initiative of SAASTA (the acronyms used to be PUB FEST, which sounded a lot of fun!) to design, make and distribute workshop kits for schools to demystify DNA and the GM technology, and to encourage discussion of their applications. These kits have proved so popular that Valerie is now engaged with a colleague, Mrs Khalipha Ramahlape, in developing the kits for rural communities. The accompanying illustration shows members of the Centre being guinea pigs for another activity that demonstrates how easily HIV is sexually transmitted. Although everyone had a lot of fun, the chilling take home message was clear.

I have tried to give a snapshot view of the varied aspects of medical biochemistry practiced in the Centre- there are of course many other tales to be told - but they will have to wait until the next newsletter.

Department of Biochemistry and Microbiology, UPE

Reported by Vaughn Oosthuizen

Ryno Naudé undertook two research visits to Europe and the Far East in 2003. In July/August he spent six weeks at the Eötvös Loránd University, Budapest, in the laboratory of Prof László Gráf. Their collaborative work on ostrich trypsin(ogen) has been funded for the past three years as part of the Hungarian-SA intergovernmental S+T Programme for 2001-2003. In October/November he spent six weeks in the Far East. At the Chinese University of Hong Kong he visited

Professors Bun Ng and Chris Cheng and discussed collaborative work on medicinal plants. In Japan Prof Naudé spent four weeks in the laboratory of Prof Koji Muramoto at the Department of Biological Resource Sciences, Tohoku University, Sendai. N-terminal amino acid sequencing of biomolecules from UPE M and D students was undertaken and a series of lectures was presented to postgraduate students and academics on UPE's ostrich research. Collaboration with Prof Muramoto's laboratory was also initiated focusing on collagenases/ metallopeptidases/ gelatinases. He visited Sagamihara (outside Tokyo) where he lectured to members of the Japan Ostrich Council on "Ostriches as a bioresource." Ryno also discussed collaborative research on the cDNA sequencing of ostrich POMC with Prof Hiroshi Kawauchi of the Laboratory of Molecular Endocrinology, Kitasato University, Sanrika. Ryno also attended the third international Proteolysis Society meeting in Nagoya where he presented two posters: "Activities of the proteasome and cathepsins B, L, H and D in ostrich meat" (Naudé, Thomas, Gondoza, Oosthuizen & Hoffman) and "Kinetic investigation of the 20S proteasome from ostrich skeletal muscle" (Naudé, Thomas & Oosthuizen).

Prof László Gráf visited UPE in November 2003 after being granted an honorary professorship in the Department of Biochemistry & Microbiology at UPE. He delivered an address "Science, Friends and Lands" to students and staff. He was also at UPE as part of the Hungarian-SA cooperation.

Two projects in the department are funded in the NRF Indigenous Knowledge Systems focus area. One is headed by **Maryna van de Venter** and is investigating the status of traditional medicine in the Nelson Mandela Metropole. It is a multi-disciplinary project involving researchers from our own department as well as pharmacy, chemistry and anthropology. Traditional medicines and indigenous plants are tested for *in vitro* biological activities such as antidiabetic, anticancer and anti-HIV activities in collaboration with Drs **Saartjie Roux**, and

Vaughan Oosthuizen. Plants that are found to be active are investigated further to determine their mechanisms of action and identify active ingredients. Traditional healers play an active role in the research and benefit through workshops to improve the microbial quality of their medicines and their knowledge about specific diseases such as diabetes, hypertension and HIV/AIDS. A medicinal garden will be started this year (2004) for traditional healers and as a source of research material.

The second IKS project is headed by **Carminita Frost** who investigates finding novel anticoagulants as thrombosis is one of the major causes of morbidity and mortality associated with stress related diseases. A collaborative area between Drs van de Venter and Frost is the search for compounds that could have both an anticancer and anticoagulant biological activity as it has been well documented that cancer cells are able to activate coagulation, which provides masking from the immune system.

The third research project within the department investigates human antibody receptor proteins expressed heterologously in *Escherichia coli*. The project is funded by the MRC as well as the NRF Unlocking the Future focus area and is headed by Dr **Vaughan Oosthuizen**. In June 2003, Vaughan and two postgraduate students, Brodie Daniels and Earl Prinsloo used the Biacore facility of Dr David Pugh at the University of the Western Cape to analyse the binding affinity of two Fc-receptor proteins to human IgE and IgM. Ms Daniels completed her Masters degree and is now working at Bristol University.

The fourth research project focuses on the role of proteases in the maturation of ostrich meat, headed by Ryno Naude and funded by the NRF Economic Growth focus area. Collaboration has been initiated with Louw Hoffman from Department of Animal Sciences, University of Stellenbosch, and Lorinda Frylinck from Meat Science Centre, ARC.

At the April 2004 graduation of UPE eight BSc (Honours), four MSc and three PhD students were awarded degrees. The PhD students are **Michelle Gehringer** ("Hepatocellular responses to microcystin-LR in *Balb/c* mice: detoxification, oxidative stress and gene expression"), **Clint Brauns** ("The effects of selected proline-based cyclic dipeptides on growth and induction of apoptosis in cancer cells") and **Adele Thomas** ("Purification and characterization of 20S proteasome from ostrich skeletal muscle and its role in meat tenderisation". The four Masters students graduating were Nicki Botha, Brodie Daniels, Hati Gondoza and Siobhán Harnett. Ms Harnett graduated *cum laude*, investigating the anti-HIV activities of two plants used in traditional medicines of the Eastern Cape. During her study she collaborated with Debra Meyer from the Department of Chemistry and Biochemistry at RAU, looking at the efficacy of plant extracts in preventing HIV infection and inhibition of HIV in pre-infected human PBMCs and a lymphocyte cell line.

All in all, 2003 was an eventful year in Biochemistry and Microbiology, UPE. Next time we report, look out for our new institutional name, the **Nelson Mandela Metropole University (NMMU)**, as 2005 marks the birth of our merged institutions of UPE and PE Technicon!

Department of Biochemistry, RAU University / University of Johannesburg

Reported by Ian Dubery

Internationally competitive research, growing international collaboration and excellent teaching have become hallmarks of RAU University's Biochemistry Department.

The staff of Biochemistry at RAU consists of Prof. Ian Dubery (professor and current chairman), Prof. Liza Bornman (associate

professor), Dr. Debra Meyer (senior lecturer), Dr Marianne Cronje (lecturer), Dr Henriette van Heerden (lecturer), Mr Riaan Meyer (instrumental scientist) and Ms Jacinda James (technical lecturer).

Teaching Biochemistry to undergraduate students continues to be a major component of the department's activities. In addition to its normal spectrum of Biochemistry modules, the department also offers Introductory Biochemistry and Molecular and Cellular Biology on first year level. The 250 first year, 100 second year, seventy third year and 12 honours students are the result of a steady growth over the last few years. The department is also actively involved in RAU's annual Open Day and WETRAH programmes aimed at scholars where the career prospects in Biochemistry and the research activities in the department are highlighted.

The research activities of the department focus on host : pathogen interactions and includes aspects of plant-, human- and microbial biochemistry. The molecular genetic basis of disease resistance and susceptibility as well as induced defense mechanisms in response to pathogens are investigated. Biochemical responses against environmental stress conditions are also researched.

The academic staff regularly attend international meetings and visit overseas laboratories to present their research results. Official collaborations exist with several overseas universities and this has contributed to exchange visits of staff and students. The strong research focus has also contributed to an excellent record of postgraduate student training, with 12 Masters and Doctoral students graduating in 2003 and a further 21 registered for 2004.

The group of Prof Ian Dubery focuses on inducible defense mechanisms in plants. He collaborates with Prof. Thorsten Nürnberger from the University of Tübingen in Germany and their research is funded through grants from the Volkswagen Foundation. The current

focus is on bacterial lipopolysaccharides (LPS) as 'pathogen-associated molecular pattern' (PAMP) molecules and LPS as an elicitors of innate immunity in plants. The group recently identified the first LPS-responsive MAP kinase to be reported in plants and identified NO as a signal molecule in LPS perception. In addition, several genes that are differentially expressed upon elicitation with LPS were identified that exhibit similarity to genes involved in mammalian and insect innate immunity. Further characterization of these genes through genome walking and the gene characterization will increase our understanding of the molecular mechanisms of defense in plants. The molecular genetic approach to LPS-induced defense is complemented by proteomic studies to investigate differential phosphorylation of proteins involved in signal transduction.

Dr Henriette van Heerden, previously from FABI at UP and the ARC Onderstepoort, joined the department in October 2003. Her specialization area is molecular plant pathology and she has launched projects on the molecular genetics of resistance against tomato curly stunt virus (ToCSV). A major objective of this project will be to identify genes that confer resistance to ToCVS. These genes will enable marker-assisted breeding. Wild tomato cultivars will be screened using infected whiteflies to determine resistance to ToCSV. Suppressive subtractive hybridization will then be used to obtain a cDNA library enriched with gene transcripts related to resistance to ToCSV. Gene transcripts can be selected from the subtractive library through microarray technology and characterized through sequencing homology searches.

The group of Dr Marianne Cronjé focuses on stress proteins and plant resistance, and investigates aspects of the interaction of heat shock proteins (HSP) and programmed cell death (PCD). Host defense against pathogens is jeopardized by heat. While HSP are commonly induced by heat stress, it is not considered to be a pathogenesis-related protein. We previously reported potentiation of heat-induced Hsp70 in the presence

of physiological levels of salicylic acid (SA), a key signalling molecule mediating the resistance response in plants. We have also demonstrated a correlation between SA-potentiated levels of Hsp70 and decreased PCD. Mechanisms behind these responses are being investigated. An understanding of the effect of HSP, and specifically Hsp70 in plant defense responses, is necessary to exploit the beneficial effects of both these events implicated in cell survival.

Prof. Liza Bornman is currently involved in research relating to candidate genes in tuberculosis susceptibility in indigenous populations. In collaboration with Prof Adrian Hill, The Wellcome Trust Centre for Human Genetics, Oxford University, she recently completed a study on West Africans proposing that vitamin D receptor gene (VDR) haplotypes, rather than individual SNPs, are responsible for previously reported VDR associations with TB. This work was has been accepted for publication in the Journal of Infectious Diseases. Functional studies on the VDR is planned to verify the role of VDR haplotypes on differential VDR expression and function.

Dr Debra Meyer leads another group in the field of peptide immunogens, vaccine design against HIV and alternative therapies for HIV/AIDS. She is presently preparing for a six month sabbatical visit to Beth Israel Deaconess Medical School of Harvard University in Boston where she will work on a project involving recombinant HIV vaccines. Awards from the NRF and the Fulbright South African Researcher Programme will fund the sabbatical visit. Dr Meyer was nominated to the NSTF awards as junior researcher and is listed as a finalist. She is also extensively involved in HIV/AIDS community service and is on the executive board of the Township AIDS Project.

This is the last news item from Biochemistry at RAU; from 1 January 2005 we will merge with the Technikon Witwatersrand (TWR) to form a new, comprehensive university. The councils of the Rand Afrikaans University and the Technikon Witwatersrand have decided on

‘University of Johannesburg’ as the new name when the two institutions merge, not only to reflect the new university's geographical locality, but also ‘the vibrant spirit and economical, industrial and business acumen associated with it’. The new identity will provide the institution with the necessary national and international recognition, and the name will serve as a binding factor for all stakeholders in the new university, which will be one of the biggest residential universities in South Africa.

The departments of Biotechnology and Food Technology from TWR will join the Faculty of Science at RAU. This is a unique opportunity to develop new aspects to our teaching and to strengthen our research capacity and we are looking forward to exploit the opportunities offered by the merger and to collaborate with our new colleagues.

Contact detail: Prof. Ian Dubery, Department of Biochemistry, RAU University / University of Johannesburg, P.O. Box 524, Auckland Park, 2006. Tel. +27-11-489-2370, Fax: +27-11-489-26

Department of Biochemistry, University of KwaZulu-Natal

Reported by Dean Goldring

The University of KwaZulu-Natal logo depicts a shield and the world indicating the regional and global ties of the University. Each band on the shield and each ray from globe represent one of the five campuses, four in the greater Durban area and one in Pietermaritzburg. The open book represents academia.The department of Biochemistry comprises the Biochemists from the former University of Durban-Westville and University of Natal, Pietermaritzburg campus. Biochemistry will be offered in two centres, Durban and Pietermaritzburg.The department is now within the School of

Biochemistry, Genetics, Microbiology and Plant Pathology.

Prof Dennison has had a second edition of his book on Protein isolation published. I find the text full of useful hints, teaching tools and excellent diagrams that have helped my teaching and been useful for student understanding. Dr Cheryl Hopkins "The nutritive value of Italian ryegrass (*Lolium multiflorum*) selected for high dry matter and nonstructural carbohydrate contents" from Clives' laboratory and Mukthar Ibrahim Salih "Possible role of neutrophil matrix metalloproteinase-9 (MMP-9) and tissue inhibitor of metalloprotease-1 (TIMP-1) and the killing of microorganisms" graduated from Edith's laboratory in 2003. Prof Trevor Anderson with his Science Education Research Group is making a mark on our teaching and research with the results of his research findings. Tracy Hull "Students' use of diagrams for the visualisation of biochemical processes" graduated from Trevors' lab in 2003.

Prof Goldrings' work on Malarial protein kinases, in collaboration with Prof Christian Doerig (INSERM, MRC Glasgow) has Franco-NRF funding and is beginning to produce interesting publications. Tamara Hiltunen "Elemental composition in monocytes in response to anti-malarial drugs and hemozoin", Janene Thompson "Coupling dyes to chicken antibodies for the development of diagnostic tests", Christina Thobokgale "Evaluation of antibodies raised in chickens against antimalarial drugs" graduated with MSc degrees from Prof Goldring's laboratory 2003. Timothy Smallie "Cloning and recombinant expression of an 822 base pair region of a Pf403*Plasmodium falciparum* malaria gene" dissertation has passed examination. Tammy Hiltunen, Christina Thobakgale and Prof Goldring were awarded 2nd prize for their poster "Antibodies raised in chickens detect the antimalarial drug primaquine in monocytes" at the University of Natal, Faculty of Science and Agriculture Research day. The University "Science Road Show" team lead by Prof Goldring were awarded a GOLD medal for an "Outstanding display in a commercial category" at the Sunday Tribune Garden and Leisure Show in Pietermaritzburg and were rated as the "Most popular stand" by school

visitors at the Technox Science Expo in Sasolburg in 2003.

Prof Coetzer is currently on sabbatical. Her research collaboration with Edith Authier and 6 others on the 5th European framework ended with a workshop on Trypanosomal Proteases organised by the group in Bordeaux and featured the who's who of the field. Theresa presented a review on Oligopeptidase B in Trypanosomes and Laura Huson presented her work on alpha 2 Macroglobulin.The collaboration will continue for the next three years as the group has been awarded a 6th framework grant to work on Trypanosomal proteases as vaccine and diagnostic targets. Dr Alain Boulangé, a very accomplished Research Scientist, has been seconded by the French CIRAD Agricultural research entity to work with Theresa for four years in Pietermaritzburg. Brendan Meyer "Methods for serological and PCR detection of Salmonella enteritidis" and Pamela Mkhize "Epitope mapping of trypanosomal cysteine proteinases" graduated from Theresas laboratory in April 2004. Laura Huson completed her MSc *cum laude* within a year. Her dissertation was "The interaction of alpha2-macroglobulin with trypanosomal congopain and other cysteine proteases" and she will continue her work in Theresa's laboratory towards her PhD.

During the year we had visits from Prof Rob Pike, who was once upon a PhD and Post-Doc. at U. Natal and is now at Monash. His recent grant was the 6th largest awarded in Australia. Ryna Naudees' PhD graduate Adele Thomas will be joining Rob for her Post-Doc. Rob presented a fascinating talk on his work with Serpins. It is excellent to see Rob doing so very well. Dr Tim Skern (Vienna) talked on viral proteases in colds and foot and mouth disease. Dr A McCracken (U. Nevada) visited us and established collaboration with Clive Dennison and Edith Elliott. Prof Frank Brombacher (UCT) presented some of his work on IL-10 and knockout mice. Prof Trevor Sewell (UCT) talked to us about the structure and function of cyanide-degrading nitrolases and heat-sensitivity and GroEL and Dr Edward Sturrock (UCT) on the structure of Angiotensin-converting enzyme.

Some good news to pass on. Trevor Andersons was promoted to

Associate Professor in January 2004 and Theresa Coetzer obtained a NRF "B" rating. The Pietermaritzburg campus was awarded a "NOSA 5 Star International Platinum Safety Award" for the second year. Dean Goldring Chairs the Safety Committee for our area of campus.

Department of Biochemistry, University of Pretoria

Reported by Fourie Joubert

UP Biochemistry expands to the Bioinformatics and Computational Biology Unit

Dr Fourie Joubert from the University of Pretoria Biochemistry Department has been seconded as Senior Bioinformaticist to the newly founded Bioinformatics and Computational Biology Unit (http://www.bi.up.ac.za). Fourie Joubert, Braam Louw, Jane Morris and Robin Crewe founded this Unit from out of the Biochemistry Department. A new building has been constructed with a floor to house the Unit, and this was taken use of in the 3rd quarter of 2003.

The Unit has different functions, including presenting post-graduate degrees, short courses, and support and bioinformatics services to the University of Pretoria. It is also the core of the Gauteng node of the National Bioinformatics Network (http://www.nbn.ac.za).

The Unit currently houses 1 staff member and 9 post-graduate students (ranging from BSc Hons to PhD). Students are currently registered for degrees in Biochemistry, Biotechnology or Computer Science, but from the beginning of 2005, formal degrees in Bioinformatics will be presented. Facilities inlucde a Sun V880 server (a kind donation from Sun Microsystems), a 64x CPU Linux cluster, A SGI Origin 2000 server, a Sun 3910 Storage Array, a Sun L180 backup robot, a 24x PC training lab and various workstations for staff and post-graduate students.

http://www.sun.ac.za/saf/

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Research projects currently active in the node include structural modeling of enzymes from the malaria parasite, microarray data analysis and software development, and the annotation of the *E. ruminantium* genome recently sequenced by the group of Prof B Allsopp at UP Veterinary School / Onderstepoort.

For more information, please contact Fourie Joubert (fjoubert@postino.up.ac.za).

Department of Biochemistry, Stellenbosch University

Reported by Jacky Snoep and Janet Hapgood (Chairperson)

WHAT'S UP IN STELLENBOSCH?

Eagerly preparing for the next SASBMB meeting in January 2005, the Stellenbosch University's Biochemistry department has again excelled in award winning research while maintaining high standards in teaching and service provision. We are a highly dynamic department with research ranging from fundamental to applied and from theoretical to experimental topics, keeping abreast of new developments in fields as diverse as Systems Biology to new molecular biology techniques.

Prof. Jannie Hofmeyr, the recipient of the Harry Oppenheimer Fellowship Award and the SASBMB Beckman-Coulter gold medal in 2003, is currently working in France together with A. Cornish-Bowden and in the Netherlands with H.V. Westerhoff. He is developing a theoretical framework for the analysis of biological systems and the complexity of life itself. Prof Johann Rohwer, P-rated by the National Research Foundation in 2002 received the SASBMB Beckman-Coulter silver medal in 2003 and is setting up one of the few NMR facilities for analysis of biological systems in our country. The department's five research groups, which include seven NRF-rated scientists,

continued to produce internationally recognized research outputs in both basic and applied research, with 14 articles published in accredited journals during 2003. The strong research focus has also ensured an excellent record of postgraduate student training, with 52 postgraduate students registered in the department for 2003.

The staff includes 12 permanent academic staff members, i.e. Professors; Janet Hapgood (chairperson), Jannie Hofmeyr, Pieter Swart, Jacky Snoep, Dirk Bellstedt and Johann Rohwer: Doctors; Ann Louw, Marina Rautenbach and Amanda Swart, and Mr Edward Foster, Ms Donita Africander and Ms Zaino Allie. In addition, Prof John Hastings and Prof Wil Konings were recently appointed as Extraordinary Professors within the Department. We also have an outstanding administrative and technical permanent staff of 13 persons.

The department has many active international collaborations with groups in Sweden, Denmark, The Netherlands, Belgium, Great Britain, Switzerland, Germany, and the USA. These combined research efforts have resulted in publications but also in exchange of staff and students aiding to the quality of research and dynamics inside the department.

Prof Dirk Bellstedt's group continued their research in the applied immunology and plant molecular systematics fields. Annelise Botes was awarded a Ph D degree in April 2004 for her research into the immunity and diseases of ostriches, and together with Hanlie Thiart (M Sc student) worked on immunity against avian malaria in the African Penguin. Liza van der Merwe (M Sc student) is working on vaccine development against ostrich mycoplasmas. Prof Bellstedt attended the 4th International Congress of the Federation of African Societies for Biochemistry and Molecular Biology in Yaounde, Cameroon, as official delegate of the SASBMB and presented some of the results of this research there. Mark Matzopoulos (M Sc student) has cloned and expressed the coat protein genes of local varieties of potato viruses for antibody production with a view to developing highly specific ELISA

kits. A number of plant molecular systematic projects are being conducted in his laboratory. Benny Bytebier (Ph D student) and Kenneth Oberlander (Ph D in Botany) are researching the relationships in the orchid genus Disa and Oxalis respectively. Margaret de Villiers (Ph D in Botany) is using nuclear microsatellite and chloroplast sequencing analyses to study the relationships in the genus Streptocarpus.

The research of the Africander, Hapgood and Louw group focuses on the mechanisms of gene regulation by steroid receptors, within the physiological context of reproduction and stress. Ms Donita Africander focusses on the mechanims of action of synthetic progestins. Prof Janet Hapgood focusses on regulation of gene expression of the GnRH receptor, as well as mechanisms of ligand-specific regulation via the GR, in particular via some synthetic progestins. Dr Ann Louw focusses on the glucocorticoid receptor (GR) and estrogen receptors, and on the plasma binding proteins of the cognate ligands for these receptors, corticosteroid binding globulin (CBG) and sex hormone binding globulin (SHBG). The last 18 months have been very fruitful and active for the group. In 2003 Ann spent five months in the laboratory of long-standing collaborator, Prof Guy Haegeman, at the RUG in Gent, Belgium. She continued work on the dissociative glucocorticoid potential of a novel non-steroidal compound, Compound A, synthesized by the Stellenbosch group. Compound A appears to be a compound in which transactivation and transrepression of the glucocorticoid receptor is separated and therefore a good candidate as an anti-inflammatory drug with minimal side-effects.

Professors Jannie Hofmeyr, Jacky Snoep, and Johann Rohwer lead the Triple-J Group for Molecular Cell Physiology. The Triple-J Group studies the control and regulation of cellular processes using theory, computer modelling and experimental approaches. Research projects on the development and application of tools for computational systems biology by the Triple-J group form the core of the National

Bioinformatics Network node that has been awarded to the University of Stellenbosch. The simulation package PySCeS has been released (http://pysces.sourceforge.net) and the database for kinetic models accessible via the internet (http://jjj.biochem.sun.ac.za) has started official collaboration with the international journals Microbiology and European Journal of Biochemistry and is accessible via mirror sites in Europe and the USA. On the experimental side, projects focus on quantitative understanding of cellular processes, studied mostly in yeast and other unicellular organisms. A fermentation facility now containing fifteen fully controlled 1L fermentors and four 10 to 20L fermentors with downstream processing facilities has been set up by Jacky, in collaboration with the Microbiology, Wine Biotechnology and Chemical Engineering departments.

Dr Marina Rautenbach leads the BIOPEP Peptide Group, in collaboration with Prof John Hastings, in research on a new generation of antibiotics, namely antimicrobial peptides. The group's basic research revolves around the precice mechanism of membrane action of natural and designed antimicrobial peptides and the resistance towards certain antimicrobial peptides. One of their applied research projects focusses on the influence of barley proteins and antimicrobial peptides on beer foam and beer fermentation, in collaboration with South African Breweries. Collaboration with a group in Sweden involves the design and characterisation of small linear antimicrobial peptides and peptide hybrids for application in nanotechnology and bio-sensors. Marina spend an eight months study leave in Amsterdam in 2003.

Prof Pieter Swart leads an active group, which includes Ms Zaino Allie, in the applied field of development of novel membrane-based bio-affinity separation systems for the detection and purification of high value end products from biological effluents. In addition, Pieter and Dr Amanda Swart lead another group investigating basic scientific questions on the expression, activity and control of cytochrome P450-dependent enzymes involved in mammalian

steroidogenesis. Pieter spent a four months sabbatical at the University of Edinburgh in 2003.

Teaching Biochemistry to undergraduate students continues to be a major component of the department's activities. The 393 second year, 160 third year students are the result of a steady growth over the last few years. Biochemistry forms an integral and compulsory part of many of the programmes within the Science Faculty, including Molecular and Cellular Biology, Biodiversity and Ecology, Biotechnology, Human Physiology and Bio-organic Chemistry.

The department prides itself on having a relaxed, democratic, cooperative and fun atmosphere. The language of instruction at the undergraduate level is predominantly Afrikaans, but the teaching staff strives to accommodate students from other language groups. For example, extra lessons are offered to some of the second year Xhosa-speaking students by a Xhosa-speaking member of staff. At postgraduate level, the language is predominantly English.

The department also interacts with a group within the university which provides information and help to prospective students from disadvantaged backgrounds and provides a link for more specific guidelines in the field of Biochemistry, especially to the first year students (see http://www.sun.ac.za/prosstudent/). The department is also actively involved in the university's annual *Open Day* and *Winter School Program* where scholars get exposed to the department's research and to potential employment opportunities in the field of Biochemistry. In addition, the department is involved in a program aimed at increasing the proficiency of teachers from previously disadvantaged secondary schools in biology and biochemistry.

The department would like to extend a warm and sincere invitation to prospective new undergraduate and postgraduate students to contact us if they are interested in furthering their studies in the Department of

Biochemistry at Stellenbosch University. We hope to welcome you all during the SASBMB 2005 "Molecules-R-US" meeting where you can experience Stellenbosch's science and taste its products.

Postal Address:
Dept of Biochemistry
University of Stellenbosch
Private Bag X1
MATIELAND 7602

Physical Address
Dept of Biochemistry
University of Stellenbosch
JC Smuts Building
Van der Bijl Street
STELLENBOSCH 7600

Tel: +27 21 8085862
Fax: +27 21 8085863
E-mail: LLE@SUN.AC.ZA (Lynnette Eygelaar, Secretary)
Website: http://www.sun.ac.za/biochem/

SASBMB Student Members

Dear Student Members of the SASBMB,

We welcome all new and old members to the Society. We hope you have had a productive year in your studies (as well as in your social lives) since the 18th SASBMB Congress held in Pretoria last July. We believe there are some of you who are already practicing for next year's Conference Volleyball Tournament. Hope you're also making progress in terms of Science!

As your student member representatives, Nyaradzo and I have been quite busy trying to formulate a student database on the SASBMB Website (www.sasbmb.org.za). For this we required you all to submit your details to us. We hoped to get accurate student member details so that we can make sure that you are in touch with up-coming events and activities within the Society. If you have not submitted these details as yet, we encourage you to do so. We envisage that all student members be allowed the opportunity to interact via the website along academic and social developments. We are also in the process of organising

student member representatives at each university or institution. We hope these representatives will facilitate the forwarding of important information and also help in referring any questions you may have pertaining to the Society.

Furthermore, we encourage anyone interested in, or involved with Biochemistry, Molecular Biology and related fields to sign up as student members, particularly if they are interested in attending the 19th SASBMB Congress to be held in 2005 in Stellenbosch. Student members are always offered reduced rates upon joining prior to conferences. Conferences allow students the opportunity to present their data, interact with students and staff from other universities and learn about the latest scientific equipment (window shopping with supervisors is encouraged). There is always a wonderfully competitive and interactive spirit present at these types of gatherings, particularly from the student member side. To encourage student participation at international conferences, the SASBMB Council has approved a postgraduate student travel bursary worth R5000 each for three students per year. To apply please forward a full CV, conference details and supervisor's motivation letter to the President (g.blatch@ru.ac.za). Please also declare any other travel awards or grants received.

We hope you all continue making progress in your respective projects and academic undertakings. We wish all our members an enjoyable and fruitful second semester.

Regards,

Petra and Nyaradzo
P.S. Our contact details are:
Petra: g95g5435@campus.ru.ac.za (Rhodes University)
Nyaradzo: nyaradzo@chemeng.uct.ac.za (University of Cape Town)

We'd love to hear from our student members!

EDUCATION FORUM

The Importance of Visual Literacy in the Education of Biochemists

Konrad Schönborn & Trevor Anderson
Science Education Research Group (SERG), School of Molecular & Cellular BioSciences, University of KwaZulu-Natal, Pietermaritzburg

According to Lowe (2003) and other education researchers, just like verbal literacy means to be able to *read* and *write* language, and numerical literacy involves the reading and writing of numbers, visual literacy encompasses the ability to *read (*understand or make sense of) as well as *write* visual displays, including the ability to think, learn, and express oneself in terms of images. Generally, visual displays can be in the form of static diagrams, animated images or as multimedia.

Visual displays are increasingly being used for the teaching and learning of science, including biochemistry. Much of modern biochemical research depends very heavily on the visual literacy of its researchers. The use of computer software for the generation of images and animations for the visualisation of biochemical molecules and processes has become a major tool in biochemical research. Such software is particular used in the study of topics such as protein structure-function relationships, protein or drug design, and bioinformatics. Now, more than ever before, researchers and learners are able to easily construct and manipulate two- and three-dimensional images of biochemical molecules and processes. The demand for this capability has resulted in the rapid development of a wide range of different modelling, animation, simulation and multimedia software packages (e.g. *Mage*, *RasMol*, *Chime* and *Hyperchem*), which are available from various commercial companies, websites or on CD-ROMs supplied with modern textbooks.

The term *multimedia* has become somewhat of a 'buzzword' in today's fast-moving and technological age. Formally, the term refers to, "the combination of multiple technical resources for the purpose of presenting information represented in multiple formats…" (Schnotz and Lowe, 2003). Some of the *multiple formats* available to viewers include text (sentences), static (still) visual displays, dynamic (animated) visuals, video visuals as well as sounds. When two or more of these formats or media are combined, then we no longer have a single medium of communication, but a *multimodal* medium. In other words, we have a multimedia consisting of the simultaneous communication of multiple formats. Only recently researchers have begun to investigate multimedia learning in any earnest. In this regard, the focus has been mainly on how to combine different forms of information in such a way as to minimise cognitive load and ensure the greatest learning benefits. Much of the inroads that have been made in this field can be attributed to the efforts of Richard Mayer whose research has led him to propose a *theory for multimedia learning* (Mayer, 2003). His theory identifies four aspects that highlight the potential of multimedia learning. Firstly, his research has illustrated the existence of what he calls a *multimedia effect*, in which he has shown that a combination of both pictures and words leads to the most fruitful understanding. Secondly, he describes a *coherence effect*, which suggests that learning from multimedia is increased when irrelevant information is removed. Thirdly, his *spatial contiguity effect* suggests that learning from multimedia is enhanced when words are placed in close proximity to pictures. Finally, his proposed *personalization effect* advocates that students construct more powerful mental models of phenomena when accompanying text is presented in a 'conversational' manner as opposed to a 'formal' one. Added to the above ideas for optimising the use of multimedia in teaching and learning are the following research findings.For one, students should not simply be left to use a multimedia package on their own. Instead, the lecturer should facilitate the whole process and closely monitor, both informally through observation and formally

through assessment, whether the student has the necessary skills to use the package and whether they are actually learning from the package. This approach is imperative for fostering an active, rather than a passive learning environment, one of the cornerstones of modern learning theory.

Three major factors (Schönborn *et al.*, 2002) determine how effective a visual display, whether static or animated, can be interpreted and, therefore, used for teaching, learning and research. Firstly, the individual requires the relevant *knowledge* that will enable them to interpret the visual display. This includes knowledge of the biochemical concepts of relevance to the visual display, as well as knowledge of the symbols and conventions used in the visual display. This knowledge also includes the procedural know-how of the process needed to interpret a particular type of visual display. For instance, different cognitive processes are used to interpret different displays such as graphs, flow diagrams, and computer images. This procedural knowledge is especially important for interpreting technical diagrams such as electrical circuits and x-ray crystallography maps. The second factor that strongly influences one's ability to interpret a visual display is a person's *reasoning skills*. These include the ability of the individual to reason with, or read, the visual display thereby making sense of it. In order to make sense of it, the person also has to simultaneously select and engage their conceptual knowledge of relevance to the visual display, i.e. they have to 'reason' with their conceptual knowledge. The third, and final factor determining how effective a visual display is interpreted is the nature, mode, quality and therefore, *intelligibility of the visual display* itself. That is, the display needs to be a good and meaningful representation of the phenomenon, concept or process. Also, it must be readable, accurate and not too complex. All three of the above factors have to be sound for successful interpretation of the visual display to occur. For example, if the individual's conceptual knowledge and reasoning ability were excellent, but the visual display was a very poor representation of a phenomenon, the visual display

could be poorly interpreted. By contrast, if the display was sound but either the conceptual knowledge or reasoning skills were limited, poor interpretation could also result. Thus, in summary this means that a biochemist's visual literacy depends on a combination of their knowledge and skills as well as the nature of the visual display.

Despite the extensive range of computer packages available for the visualisation of biochemical phenomena, there has been little or no research done to investigate the *actual effectiveness* of such packages for improving students' visualisation and conceptual understanding in biochemistry. As stated by Richardson and Richardson (2002), famous for their development of *ribbon* displays to depict 3-D protein structure in biochemistry, "…there is little experimental data on either the absolute or the relative effectiveness of these materials [multimedia] for teaching 3-D literacy and only minimal guidance about the best ways to use them…". The failure of biochemists to question and research the effectiveness of such packages is mainly because experts tend to naively assume that what they perceive as being good teaching and learning tools will necessarily be good for promoting visualisation and understanding among novices. On the contrary, extensive science education research has shown that there are often large discrepancies between experts' and novices' abilities to interpret and learn from visual displays such as diagrams, pictures, computer-generated images and animations. This is because experts tend to have greater conceptual knowledge and more advanced visualisation skills (e.g. image reading skills and spatial visualisation skills) than novices do. In fact, research has shown that students sometimes learn very little from diagrams and computer images and instead, develop misconceptions from using them (Hull & Anderson, 2003; Schönborn *et al*., 2002).

Related to the above, one major concern that has been put forward in the recent science education literature is the automatic superiority that has been bestowed upon animated graphics. Since modern animated visual displays have a large aesthetic appeal, many educators simply

assume that animated visuals will be much more powerful than static visuals for learning. But research has shown that this is not always the case: learning with animations may not always yield fruitful and automatically assumed outcomes. Lowe (2003) has provided two possible reasons for this notion. In what he terms *overwhelming*, he says that an animated visual requires extremely high processing demands; the fact that the presented information is dynamic and aesthetically pleasing does not always mean that the viewer will necessarily benefit. It follows, in what Lowe (2003) terms '*underwhelming'*, that the viewer may decrease their level of required engagement with the visual, due to its highly dynamic and aesthetic appearance. In turn, this results in a potential negative effect on the learning process due to the cognitive load placed on the viewer. Clearly, there is an urgent need to screen all visual aids for their effectiveness as teaching, learning and research tools in case they cause more harm than good. At the same time, it is also important to research the best methods for teaching and learning with such visual aids as well as ways of improving the design features of images and animations so that learning and research is optimised.

In conclusion, biochemists need to ensure, with the aid of biochemical education research, that the visual displays they use are indeed effective as tools for teaching, learning and research. Furthermore, biochemistry departments need to produce *visually literate undergraduate and postgraduate students* with the knowledge and skills for reading and processing visual information and displays. In this regard, since science education research has shown that such visual knowledge and skills are usually not simply acquired by students through 'osmosis', it is considered essential to explicitly teach and assess this type of knowledge and skills through especially designed instruction and assessment tasks. That is, just like practical knowledge and skills are taught in all biochemistry departments, we are proposing that the teaching of visual literacy should be part of all modern biochemistry curricula.

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Konrad Schönborn and Trevor Anderson
Science Education Research Group (SERG), School of Molecular & Cellular BioSciences, University of KwaZulu-Natal (Pietermaritzburg)
P/Bag X01 Scottsville 3209; Tel. +27-33-260-5464/5429; Fax. +27-33-260-5462
Emails 962058272@ukzn.ac.za; anderson@ukzn.ac.za

A debate on the BSc Biochemistry qualification
Report by K.J. Schönborn and J.A. Verschoor

The BSc (in Biochemistry) qualification that we were all so well acquainted with has come under fire by a new approach towards tertiary education that aims to do away with traditional borders and identity in favour of more interdisciplinary and integrated learning. All over the country, departments of Biochemistry have become part of university schools and some have even lost their identity altogether. The emphasis shifted to outcomes of the BSc that were more *generic*, rather than to the content matter and specialised skills of a specific discipline that a student should master.

The 18th Congress of the South African Society for Biochemistry and Molecular Biology (SASBMB) took place from 6–9 July 2003, at the University of Pretoria. As part of the meeting, a biochemistry education workshop was held in an attempt to determine the status of a biochemist as opposed to a life scientist and a chemist in the context of the SAQA standard for the generic BSc. The overall aim of the education workshop was two-fold. Firstly, the society wished to distinguish how the outcomes stated in the generic BSc document could be applied to the discipline of biochemistry itself. Secondly, the society wanted to consider if there was a need to define and establish a separate BSc unit standard for biochemistry, i.e. a "BSc in biochemistry" standard, or whether the generic BSc itself could cater for curriculum development and assessment in the discipline of biochemistry.

A high profile panel of head of departments and delegates represented the education workshop, from most South African university institutions offering biochemistry as part of their curriculum. The workshop was chaired and facilitated by Prof. D. Litthauer, a member of the SGB for Life Sciences in higher education and training. After a heated debate, the consensus was that the generic BSc was very well accepted. It was felt that it did not threaten the existence of

biochemists or the learning field of biochemistry and had the support of the SASBMB. The BSc generic allows for greater flexibility and freedom on behalf of the learner as well as the teacher, without placing any constraints on particular content areas. In turn, this does not threaten the freedom to choose a combination of biochemistry and chemistry as two majors in a BSc and will allow the market to determine the need for such graduates. In general, it was believed that due to the cross-disciplinary nature of biochemistry as a subject, and the notion of critical outcomes, it would make good sense to support the philosophy of the BSc generic.

What was seen of central importance was that practical work in biochemistry should be taught and presented as a theoretical application in any university BSc programme that included biochemistry as a core module. A delegate viewed practical work as a process characterised by, "if you *do*, then you *learn*", and all delegates present at the workshop were opposed to any option of doing away with practical classes in biochemistry.

It was proposed that an educational committee be set up. The advice was that a proposal be submitted to the SASBMB council outlining a need for such a committee. The educational committee shall aspire to meet the following six general objectives:

1. To obtain the biochemistry curricula from different universities;
2. To monitor similarity in core knowledge so as to identify a minimum "content" and "practical" standard;
3. To formally investigate whether institutions subscribe to the generic BSc idea by obtaining and distilling further opinions on the matter;
4. To set up a form of quality control amongst universities offering biochemistry by appointing individuals who can act as quality assurors;

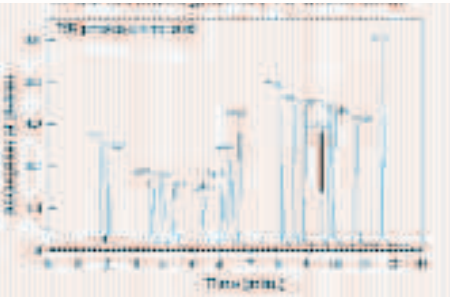
5. To suggest possible candidates who would be suitable auditors to the HEQC for biochemistry;
6. To promote the subject of biochemistry in secondary schools. With regard to this objective, the society believes that it should play a role by addressing school learners as to the nature of biochemistry as a subject. It was deemed important to promote biochemistry in schools by for example, showing that processes such as photosynthesis and the citric acid cycle are biochemical processes.

Delegates believed that a workshop of this nature was long overdue and worth communicating to the wider scientific community. The SASBMB is of the view that other subject disciplines might also have the need to convene such a debate, and this workshop represents some of the discussion and analysis that could occur. In addition, the results of this workshop could provide insight to those scientific disciplines wishing to discuss the role of the generic BSc in terms of their subject domain.

University of Stellenbosch

Central Analytical Facility

Amino Acid Analysis



HPLC-based amino acid analysis of:

- Protein and peptide hydrolysates:
  - **17 amino acids (excluding Asn, Gln, Trp)**
  - **20 natural amino acids (including Asn, Gln, Trp)**
  - **Specified amino acids and derivatives**
- Free amino acids:
  - **20 natural amino acids**
  - **Specified amino acids and derivatives**
- Quantitative and qualitative amino acid analysis
- Samples can be supplied dry, as liquid or on PVDF membranes

For sample preparation and more details on our facility and services, contact Ms Ramola Chauhan-Haubrock or Dr Marina Rautenbach

Amino Acid Analysis Facility
Department of Biochemistry
University of Stellenbosch
Private Bag X1, Matieland 7602, South Africa
Tel: 021 808 5811/808 5872, Fax: 021 808 5863
Email: chauhan@sun.ac.za or mra@sun.ac.za
http://www.sun.ac.za/saf/