



MSSA

NEWSLETTER / NUUSBRIEF

NUUSBRIEF VAN DIE MIKROSKOPIEVEREENIGING

VAN SUIDELIKE AFRIKA

NEWSLETTER OF THE MICROSCOPY SOCIETY

OF SOUTHERN AFRICA

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EDITORIAL

Here again a variety of news, views and opinions about things microscopical in Southern Africa.

We have Mike Witcomb bringing us up-to-date on the movement of monies from and the status of the MSSA Trust. Those of us who do not access this fund for reasons within its wide parameters have only ourselves to blame.

Mike then goes on to provide some insight into the next MSSA Conference in Botswana in mid 2008 and he adds some views on foreign travel and, as always, football.

Luc from Anaspec feels that we should do something about the terrible sense of loss we will feel without an MSSA Conference to attend in early December so he has a workable solution outlined on page 4 of this newsletter. I suggest that this debate should continue over the MSSA Listserv.

Two innovative applications of the MSSA trust funds are described by Jan Neethling and Alan Hodgson. Surely these are examples of exactly the sort of investment we should be making with

these funds.

I have also interspersed some commercial news which has come my way. I am about to depart as, once again, the only South African representative at the European ESEM User Group meeting now in its 8th year - an extremely valuable and functional interface between ESEM Users and the manufacturer. The programme for this year's meeting is printed on page 7 for those who might be encouraged to attend next year.

I close on page 8 with a summary of a piece of what may be called EM memorabilia. It is the charming tale of the early development of critical point drying in Japan.

Editor

This issue of the MSSA Newsletter was compiled by Tony Bruton at the Centre for Electron Microscopy at the University of KwaZulu-Natal in Pietermaritzburg. Opinions expressed in this newsletter are gained from a variety of sources and do not necessarily reflect the views of the Editor, the University, the Sponsors or MSSA. The editor may be contacted at (033) 260 5155 or by email on bruton@ukzn.ac.za. Written contributions and comment on this newsletter are welcome.

Update from the MSSA Trust

Further to the second call for applications for funds to the Trust, I am pleased to announce the following allocations:

R1,050 to Jan Neethling at the Nelson Mandela Metropolitan University to sponsoring the meals of school pupils attending the scanning electron microscope demonstration at the 2006 MSSA conference.

R5,300 to Alan Hodgson at Rhodes University to sponsor a two day optical microscopy workshop for teachers at disadvantaged and under-resources schools that had been donated optical microscopes by Rhodes University.

R5,000 to Yogis Naidoo of the University of Kwa-Zulu Natal towards presenting a paper at the 94th Indian Science Congress at Annamalai University and research visits to microscopy units at tertiary institutions in India in January 2007.

R15,000 to Stephan Coetzee at the University of Botswana to present a poster at the Microscopy & Microanalysis 2007 conference at Fort Lauderdale, Florida in August 2007.

R10,000 to Mike Lee at the University of Limpopo to attend the EMAS 2007 conference on modern developments and applications of microbeam analysis to be held in Antwerp, Belgium in May 2007.

R5,000 earmarked by the Board of the Trust for teacher training on donated optical microscopes.

The Trust has a non-tax status by SARS. This means that we must spend each year at least 75% of our income for that tax year. The Trust applied to be a Public Benefit Organisation (PBO) over a year ago, but we understand that the person dealing with such applications in Pretoria is overwhelmed and

this application could take some time yet. After legal advice, the Trust decided to start operating a year ago in anticipation of getting PBO status.

Our latest information (February 2007) is that SARS is treating MSSA and the MSSA Trust as a single unit, not as two separate units as we expected. Thus MSSA must now apply for PBO status and just like many other Societies must make appropriate changes to its constitution to satisfy SARS.

Mike Witcomb
Chairperson, MSSA Trust

SOME COMMERCIAL NEWS FROM CARL ZEISS

In a groundbreaking development project for Biotechnologies. Carl Zeiss SMT has received an order to develop a unique high-performance transmission electron microscope.

Together with researchers from the Max Planck Institute for Biophysics in Frankfurt, the Nano Technology Systems Division of Carl Zeiss SMT has developed a unique transmission electron microscope for the high-resolution phase contrast imaging of biologic materials.

The PACEM system (Phase Contrast Aberration Corrected Electron Microscope) will enable the artifact-free imaging of biological specimens through the use of a unique phase plate and an aberration corrector, thus proving scientists unparalleled insights into the molecular and atomic structure of biologic processes and mechanisms of action.

The development project is part of the Macromolecular Complexes cluster of excellence initiative and the introduction of elite universities in Germany.

You can find the complete text on the Zeiss website: <http://www.zeiss>

MSSA Conference 2008 – A passport to a new conference

There will be no MSSA conference in 2007 - how do we unwind in December 2007? Luke we need a party!

So the next conference is July 2008 at the University of Botswana. It will be the first time since we have been a Southern Africa Society that we will adventure outside the borders of SA. Looking at the map, I find that it is easy to drive there from Johannesburg. I flew there last year and that was easy. So what new will it involve? Well you will need a current passport. If like me and you are a permanent resident in SA, you will need your residence permit information stamped in your passport. I am doing that now – I have a stamp in my passport from a not friendly immigration official at the Swaziland border telling everyone that I have to go to Home Affairs for it. When I did not, subsequently I got hell at OR Tambo International! Seems that these days it is legal requirement unlike in the past. So ignore that you can show your ID book, old passport with it in, no go. In addition, the passport must have at least 6 months still to run on your exit from Botswana (true of all countries that I know of). Luke tells me the other day that you must also have 1-3 clear full pages left now in order to enter different countries, depends on the country. If like my daughter you currently have multiple current valid passports (in her case, SA, EU, Canada) sorry decisions needed, which one or two to use? And you thought that thinking of a title for your abstract was difficult!

This note is meant to start stirring up people to the realization that come around February 2008, you need wake up from summer holidays and write some abstracts. Lots of new equipment is being funded, so we expect lovely cool new images and applications presented.

For the birders, there is the Delta and other places with new lifers. Me, what do I hope

to do? Go birding the week before in the Delta, then MSSA conference, then MSA in Albuquerque, New Mexico, then the Grand Canyon (another lifer), then hopefully “home” for a visit (Berkeley, California). Dreams!

So do not get left behind, start dreaming now and lets have some action!

I would note that the swimming pools at U. Botswana are great, especially the Olympic sized one since when I was there no-one used it since most people could not swim and so used the smaller one.

Mike Witcomb

PS. Welcome back UEFA Cup football after the mid-winter break.

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### **We can only dream....**

Consider this report from Denmark; 'The technical University of Denmark (DTU) at Lyngby, north of Copenhagen, has placed a \$11.5 million dollar order for **seven FEI microscopes** that will form the core of the university's new Centre for Electron Nanoscopy. Installation of the system is targeted for the second half of 2007 and DTU's Centre for Electron Nanoscopy is scheduled to open at the end of 2007. The order represents the largest product sale ever for FEI (*lucky salesman -is it our ever plucky Hoffman ? - Ed*) and includes two Titan scanning/ transmission electron microscopes (S/TEM's), a Tecnai 20s-Twin TEM, a Helios Nanolab 600 Dualbeam, a Quanta200 3D ESEM Dualbeam, a QuantaFEG SEM and an Inspect S low-vacuum SEM.

Sigh.....

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**An idea from Luc Harmsen –  
Please respond via the MSSA listserver**

Hi all

Been having some problems with the list sever but it seems to be working now. I sent this out last week but it did not seem to go through. Just some thoughts on the end of this year already.

Given that there is no MSSA meeting, I was thinking of look at having a **2 day workshop type meeting**.

We have seen a number of new systems being sold in the country last year and some exciting stuff for this year which includes some exciting new technology for South Africa.

I would like to make a suggestion that we set a programme that would be something like this.

#### **Thursday**

9:00 to 12  
Microscopy.                      Electron

1:30 to 4:30                                      x-ray analysis.

#### **Friday**

9:00 to 12                                      light microscopy  
1:30 to 4:30                                      Sample  
preparation.

Then in the EM morning we would invite the units who have purchased the new equipment to give a short presentation on their findings with the new systems and then time for a general discussion around EM .This in light of a Cross beam at NECSA, FEG TEMs FEG SEMs all being new in the country.

With the X-ray afternoon we could have a presentation on the latest developments in XRAY equipment. Again inviting local users to share their real results with the new SDD detectors for example, new manufacturers on the market and general discussions around X-ray analysis and even allow the including probe users visit!!!!!!.

As I am not that involved in the light microscopy, we would get someone again to chair this session who would again invite local users of special techniques and new equipment to share their results and then have some general discussion on the needs on light microscopy. We have had some recommendations on Confocal and laser scanning systems.

In the afternoon we would host a general discussion period that would cover topics like MSSA 2008 in which we can organise a bus to Botswana, have someone present on the conference.

Then a discussion around the small, but growing NANO community who seem to be doing their own thing. Or any other topics.

I would hope that by June we would have a detailed programme on what talks will be presented and then what discussions will take place. This programme can then be circulated to all interested parties and in this way attract the suppliers and the industrial clients.

I am open to some discussion on this proposal.

Luc Harmsen

Managing Director



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**SEM WORKSHOP FOR SCHOOLS**

## **AT MSSA 2006**

A workshop on the use of a scanning electron microscope in everyday life was hosted by Andy Yarwood of JEOL(UK) for learners from various schools on the first day of MSSA 2006, hosted at the NMMU in Port Elizabeth. A total of 75 learners from 8 schools in and around Port Elizabeth attended.

After an overview of the basic principles involved in electron microscopy, Andy then showed one episode of the thrilling BBC program entitled "Grime Scene Investigation". Loosely based on the popular Crime Scene Investigation (CSI) currently showing on TV in South Africa, the "Grime Busters" visit various sites in England, and use a "lab in a lorry" approach: the "grime scene" is analysed by various specialists, including an electron microscopist employing a SEM. In the particular episode, the house of a rock band is visited, after complaints from the band that they suffered from various infections. It soon becomes clear to the viewers that the four members of the band are actually living in a pigsty. The "grime buster" team collected samples from just about everything in the house: carpets, beds, cutlery, cooking pots and pans, etc. A range of mites and other nasties are found, together with various other bacteria. The movie is not for the faint-hearted, but many of the learners gathered round Andy after the presentation, bombarding him with questions. Strangely, nobody said "no" to the snacks and drinks that were provided afterwards, kindly sponsored by the MSSA Trust Fund.

Jan Neethling, NMMU

### **Microscopy Workshop for High School Teachers**

Fourteen high school teachers from seven Grahamstown schools (Benjamin Mahlasela, Kuthliso Daniels, Mary Waters, Nathaniel Nyaluza, Nombulelo, Ntsika, T.E.M. Mrwetyana) recently attended a two-day microscopy workshop (sponsored by the MSSA through the MSSA Trust) at

Rhodes. The workshop, organised by staff of the Department of Zoology & Entomology, and Mrs Rhona Duncan (Mobile Biology Laboratory) followed up on the donation of Reichert mirror microscopes in 2006 to these schools. Such microscopes were welcome as many of the class rooms used are not supplied with electricity, or at most have one power point. After donating the microscopes it was clear that there was a pressing need to provide some training in the principles of microscopy as well as microscope care and use. This was because most of the teachers, although having to teach biology, had no biological training. During their two days at Rhodes the enthusiastic teachers were shown how to maintain microscopes and carry out adjustments to obtain good images with microscopes that did not have a built in light source. In addition the teachers got to use other microscopes and they were shown some simple exercises that demonstrate basic concepts in optics and microscopy and how the histology slides that are used in the classroom are prepared. At the end of the workshop the teachers were presented with material to maintain the microscopes, some histology slides (prepared by the technical staff of the departments of Zoology & Entomology and Botany) and a certificate of attendance. Learning, however, was not one-directional. By interacting with the teachers, the workshop tutors gained greater insights into the problems of teaching Science (especially Biology) in these schools. Further workshops (including workshops on basic tissue structure) for other school teachers are planned and it is hoped that further donations of microscopes can be obtained for needy schools.

On behalf of the organizers we would like to thank MSSA for providing the funds to run the workshop and we encourage other MSSA members to run similar workshops around the country. If you are sitting with unused microscopes there are teachers and pupils out there who use them and we would certainly be able to find a home for them.

Alan Hodgson, Zoology & Entomology  
Rhodes University

## **WINNERS OF PRIZES : MSSA 2006**

Prof Japie Engelbrecht was tasked with coordinating the adjudication of prizes at the MSSA 2006 Conference, hosted at the Nelson Mandela Metropolitan University, Port Elizabeth. He wishes to thank all the sponsors for the generous prizes, as well as providing an incentive to all microscopists to deliver research results of a high standard and quality. He also wishes to thank everyone who assisted with the adjudication. Winners in the different categories are :

1. **MSSA STUDENT EVENING PRIZE : WINNERS OF THE DART THROWING COMPETITION :** Winners : Prabs Naidoo + Bronwyn Joubert (UKZN)
2. **ALS PRIZE FOR BEST MICROGRAPH TAKEN AT CONFERENCE ON JEOL SEM :** Winner : Chris van der Merwe (UP)
3. **WIRSAM PRIZE FOR BEST STUDENT PAPER (LIFE SCIENCES)**  
No nominations
4. **WIRSAM PRIZE FOR BEST STUDENT PAPER (PHYSICAL SCIENCES)**  
Highly recommended : Chumani Mshumi (UCT)  
Johan Westraadt (NMMU)  
Rainer Süss (Mintek)  
Winner : Sarah George (UCT)
5. **WIRSAM PRIZE FOR BEST LIGHT MICROSCOPY PRESENTATION (Paper or poster, any field).** Prize not awarded
6. **SMM PRIZE FOR BEST PAPER ON INNOVATIVE TECHNIQUE IN MICROSCOPY.** Winner: P. Mabeta (UP) (Medical and Zoological section)
7. **LEICA PRIZE FOR BEST PRESENTATION : CONFOCAL MICROSCOPY.** Winner :Pieter van Wyk (UFS)
8. **MARY VEENSTRA PRIZE FOR THE BEST POSTER PRESENTATION (Any field).** Prize shared between :  
Winners : Mary-Catherine Madekurozwa (UP) – Life Sciences  
Johan Westraadt (NMMU) – Physical Sciences
9. **WIRSAM PRIZE FOR MOST OUTSTANDING OVERALL PRESENTATION (Paper or poster, any field).** Winner - Lethu Nxumalo (UCT)
10. **ALS PRIZE FOR MOST PROMISING BLACK ELECTRON MICROSCOPIST (Physical Sciences).** Winner : Lethu Nxumalo (UCT)
11. **FEI PRIZE FOR BEST PUBLICATION**  
Rainer Süss, L.A Cornish and M Witcomb (Mintek/Wits)

## Programme for the 8<sup>th</sup> annual ESEM Userclub meeting, Switzerland

### Monday, 12<sup>th</sup> March 2007

- 13:00 Registration and lunch
- 14:00 Welcome: N. de Rooij, M. Dadras & Debbie Stokes
- 14:15 The ESEM story – an historical overview - Debbie Stokes, FEI Company, The Netherlands
- 14:45 A layman's view of EDX in the ESEM - Tony Bruton, University of KwaZulu-Natal, South Africa
- 15:10 EDX micro analysis under low vacuum and ESEM conditions - Rainer Ziel, Mainsite GmbH, Germany
- 15:30 Refreshments
- 16:00 ZrO<sub>2</sub> observation by ESEM: influence of pressure and gas type - Massoud Dadras, University of Neuchatel, Switzerland
- 16:20 Electron backscatter diffraction measurements in low-vacuum SEM performed on ferroelectric ceramics - Marek Faryna, Institute of Metallurgy and Materials Science, Krakow, Poland.
- 16:40 Application of EBSD in low vacuum – K. Kunze, ETH Zurich, Switzerland
- 18:30 UserClub dinner (sponsored by FEI Company)

### Tuesday, 13<sup>th</sup> March 2007

- 09:15 Overview of ESEM applications in SMN, University of Oslo, Norway - Truls Norby
- 09:30 ESEM in the Institute for Biomaterials, University of Bayreuth, Germany - Helmar Mayr
- 09:45 ESEM overview - Anna Midwinter, Merck, Sharpe & Dome, UK
- 10:00 ESEM in ZMB University of Basel, Switzerland - Marcel Düggelein
- 10:15 Refreshments
- 11:00 ESEM and applications in the Institute of Micro- & Nano-technology, TU Ilmenau, Germany - Lothar Spiess
- 11:20 Applications of ESEM in the study of drying latex films - Kalin Dragnevski & Athene Donald, Cavendish Lab, University of Cambridge, UK
- 11:45 [To be announced]
- 12:00 Carbon nanotubes and other applications at Rovira i Virgili University, Tarragona, Spain - Mercè Moncusí Mercadé & Mariana Trifonova
- 12:30 Lunch
- 13:45 Projects and a gas mixer/supply unit for the FEG-ESEM in Oslo - Truls Norby and Christian Kjølseth, University of Oslo, Norway
- 14:00 High temperature oxidation of chromium and chromium-holding alloys in ESEM - Anders Larson, University of Oslo, Norway
- 14:15 ESEM and hot-stage investigation of grain boundaries in solid-state ionic materials - Christian Kjølseth, University of Oslo, Norway
- 14:30 Experiment on QUANTA 3D: Hot stage and FIB - Daniel Bultreys, FEI Company, Belgium
- 14:50 [To be announced]
- 15:05 Refreshments
- 15:30 [To be announced]
- 15:45 News & information from FEI
- 16:30 Roundtable discussion

### Wednesday, 14<sup>th</sup> March 2007

- 09:15 Hands-on workshop [to be decided]  
or Tutorial I, ESEM principles – Debbie Stokes, FEI Company, The Netherlands
- 10:15 Refreshments
- 10:45 Hands-on workshop [to be decided]  
or Tutorial II, Imaging wet specimens – Debbie Stokes, FEI Company, The Netherlands
- 11:45 Wrap-up and discuss venue for ESEM IX, 2008
- 12:15 Lunch & departure

## A Critical Point Dryer called 'Bang'

After briefly raising their head in South Africa again during 2005/6 the company Hitachi High Technologies have, once again, disappeared from the local market. All credit to those who tried to make a go of it, this is a premium brand and a little competition on the local market would not have done any harm. During Microscience 2006 I was fortunate to make contact with the merry band who market these instruments in the UK and, as a result, received some copies of the informative house magazine 'Hitach EM News'.

The September 2006 issue has a fascinating and very colourful story about the early development of critical point dryers. Written in narrative style by Prof Keiichi Tanaka, it makes a very good read. He was apparently responsible for the development of the first Japanese CPD back in 1969.

He describes the early experiments and construction of a CPD made, according to his specification, by the 'local iron work'. Early gaskets included cowhide, rubber sheet (which popped and caused a gas leak such that 'I was attackede by a spouted gas at my belly'. Finally they got hold of Teflon, that worked and the development of the first apparatus was completed in July 1971. It appears that this development was carried out under a thick veil of secrecy since they were enormously impressed and excited by the results which they obtained. *'All of the samples prepared showed smooth and beautiful images which were not comparable with those prepared by*

*using an acetone-air drying technique.'* Their excitement was apparent *'The laboratory was full of joy. But there was a kind of depressing tension prevailing, on the other hand. It was fear for the dryer operating at a high gas pressure. It might cause an explosion with an explosive sound of "Bang". This fear led everyone to call the dryer "Bang" without clear reasons.'*

Following an approach from Hitachi Koki this design was commercially produced as the HCP-1 in about 1972. This design was later aesthetically improved (*'They said it was like an antique radio*) to result in the HCP-2.

My final quote conveys the sort of excitement which this innovative research team felt as they saw the impressive results of their product: *'When leaking a gas from the dryer, we used to knock on a leak valve gently with a wrench and controlled a gas leak. We felt an excitement as if we were opening the door of a treasure house. We also felt a shake of our body with a superiority complex. SEM images of biological tissues using the secret weapon "Bang" were introduced at the Japanese Meeting in Okayama City in May 1972 and attracted many people. It opened an era of critical point drying techniques for SEM's in Japan.'*

Footnote : Our Laboratory has used a Hitachi HCP-2 with great success since its installation in the early eighties, it was fascinating for us to hear this colourful history of its early development - Ed