ELECTRON MICROSCOPE UNIT

ANNUAL REPORT

2004

Director	**B.T. Sewell**
Principal Technical Officer (Part Time)	**J. Duncan**
Chief Technical Officer	**M. Jaffer**
Chief Scientific Officer	**B. Price**
Chief Technical Officer	**M. Waldron**
Departmental Assistant	**S. Karriem**

HIGHLIGHTS OF 2004

RESIGNATION OF DR BRENDON PRICE AND THE EMPLOYMENT OF DR BRANDON WEBER

Dr Brendon Price resigned with effect from 31 December 2004 in order to study Medicine at the University of the Witwatersrand. His period of service with the EMU was remarkable. He contributed not only in the technical areas, where his knowledge was considerable, but also in managing the finances of both the Unit and the Structural Biology Programme. Much of our progress over the past three years is directly attributable to his efforts. Professor Reddy agreed that a person could be employed in his place immediately he submitted his formal resignation. His post was advertised in November/December. Two worthy applications were received. Dr Brandon Weber was selected and commenced work in February 2005. Dr Weber has considerable experience as a user of the Unit and expertise in immuno-labelling and cryosectioning as well as having a great deal of expertise in protein purification.

DR VARSANI UPGRADED TO A T3 APPOINTMENT

Dr Arvind Varsani's salary is linked to the Structural Biology Programme and will be funded, according to current plans, by the Carnegie Corporation of New York until October 2007. He was initially appointed on a T2 contract which meant that he was unable to apply for independent grants to support the programme. The University agreed to move him onto a T3 contract giving him a level of permanence and agreed to continue his appointment subject to the success of the programme. He has been able to attract funding from the Poliomyelitis Foundation.

EMPLOYMENT OF MR. KARRIEM

Mr. Williams retired at the end of 2003. Mr. S Karriem was redeployed from the Chemistry Department and started at the Unit in January 2004. He has fitted well into the structure of the unit by taking over Mr. Williams tasks and is expanding in other areas, notably maintenance, security and general housekeeping.

CHANGE OF BUDGETING MECHANISM

Following discussions between the DVC Research, the Director of Finance and the Director of the EMU it was resolved that :

- From the 2005 year onwards, the Electron Microscope Unit (EMU) will fall into the grants category on the UCT budget;
- The grant base year will be the operational continuing budget that has been submitted for the 2005 year (amounting to R1,526,147), adjusted for PASS salaries which may be impacted by the remuneration review being carried out by the HR Department;
- Post the 2005 year, the grant will increase by the target expense rate set by the University Finance Committee, the Director of Finance and DVC Planning and Budgeting as part of the budget process each year;
- The EMU will continue to be serviced and assisted by the Science faculty where needed, at the discretion of the Dean of Science and DVC Research;
- By becoming part of the grants process, the EMU will not be excluded from the budget process and may make application for granting of capital expenditure, in competition with the rest of the UCT community;
- The EMU will still have to produce an annual budget for its internal management processes and for the EMU committee. A copy of this budget should also be lodged with the Manager: Financial Information Management and the DVC Research for their information and records. Failure to do this could result in the withholding of the grant for the subsequent years.

MEETINGS OF THE ELECTRON MICROSCOPE UNIT ADVISORY BOARD

A meeting of the EMU Advisory Board was held on 17 August 2004 Those attending were A/Prof C. de la Rey (Chairman), Professor D. Reddy, Professor C. Vaughan, Professor E.P. Rybicki, Associate Professors R. Knutsen, C. Lang and B T Sewell, with Ms M. Ward and Ms V. Thomas in attendance.

The meeting approved the 2003 annual report. Professor Reddy and Professor de la Rey committed to enabling the fundraising necessary for a 200kV TEM and the chair undertook to investigate issues of regional cross subsidization. Issues of the governance and budgeting of the Unit were discussed. These were resolved either at the meeting or at meetings which occurred subsequently and the resolutions are reported in the Stragegic Plan and in this document respectively. The relationship between the EMU and the Structural Biology Programme was also discussed and it was resolved that the programme should be located in MCB.

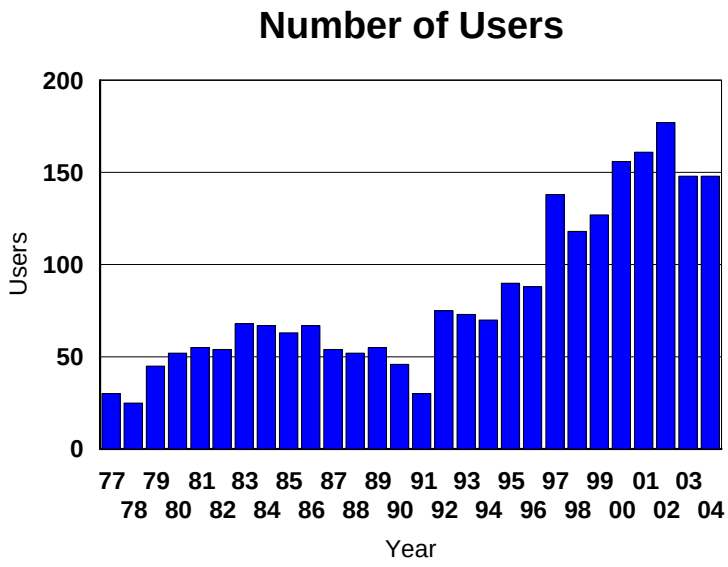
MAJOR EQUIPMENT PURCHASES IN 2004

Replacement rotary pump for the Leo 912, Cryo holder for the Leo 912, Zeolite column, differential pumping system for the Leo 912. A new computer was purchased for Dr Price.

USE OF THE UNIT

Services provided by the Unit during 2004 are listed in Table 1. Frequent usage was made of all key services of the Unit.

Fig 1 Number of users of microscopy facilities per year since 1977



148 people made use of the microscopy services of the Electron Microscope Unit in 2004, this is the same number as in 2003. Only a further 6 users utilized services other than those related to microscopy, notably the Imaging Centre and liquid nitrogen collection. Approximately 1120 litres of liquid nitrogen were supplied to other departments from the Unit. CD writing facilities at the unit are no longer in demand since most departments now have their own CD writers available.

The names and departments of the users are listed in Table 7.

Total time spent using the Unit's microscopes was 1875 hours in 2004, which is 565 hours lower than the usage in 2003. This decrease is largely due to the fact that the S200 was hardly used for EBSD by Materials Engineering in 2004.

Figure 2: EM Unit's microscope usage hours since 1990.

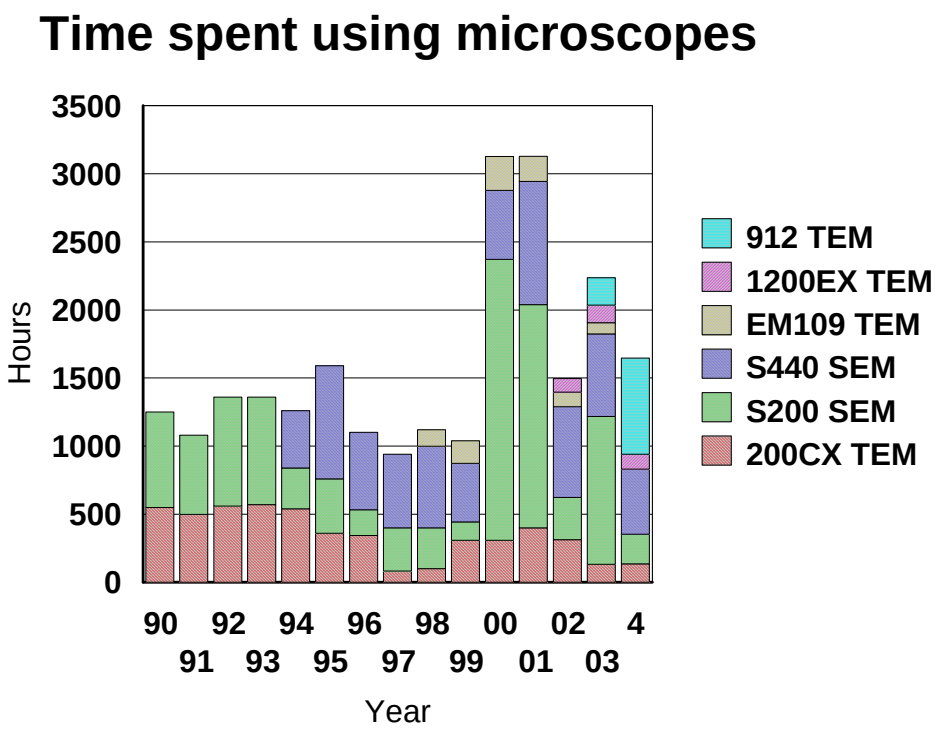
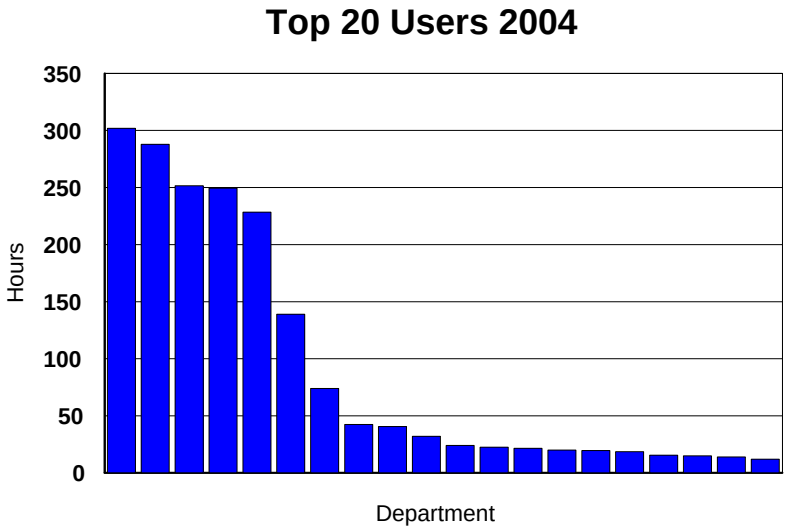
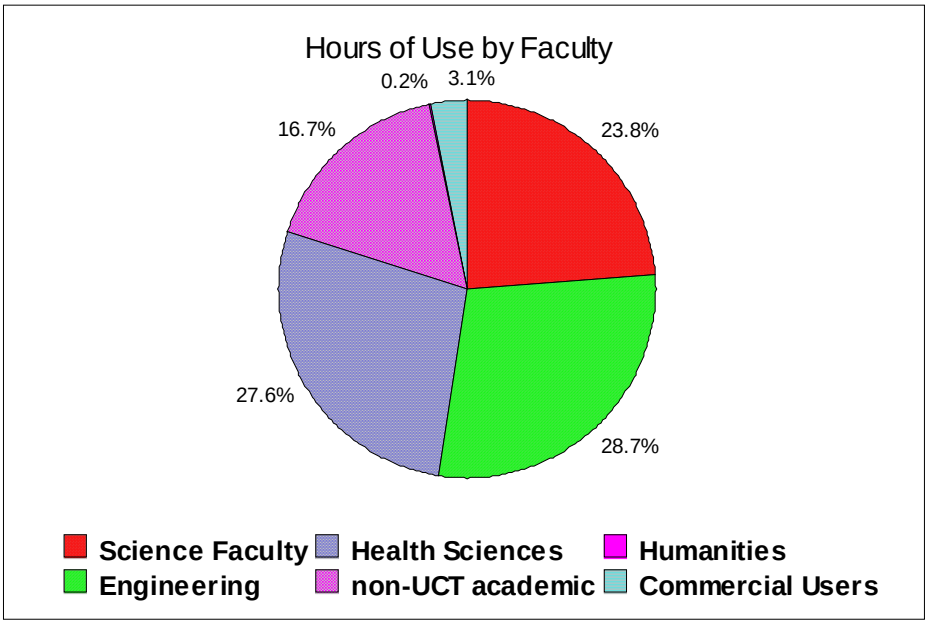


Figure 3 : Microscope usage by department, institution or company



Order is as follows:

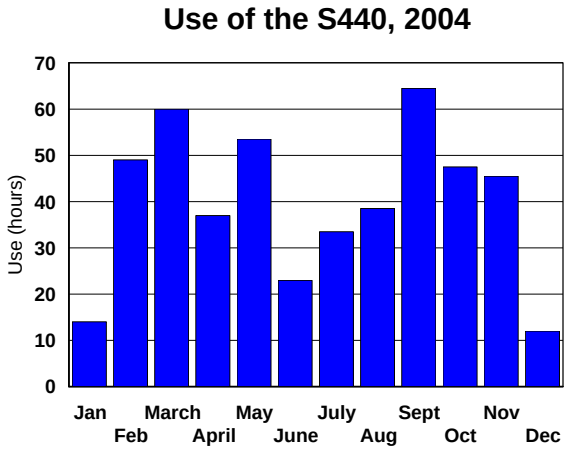
1	MCB (302 hrs)
2	Materials Engineering (288 hrs)
3	Pharmacology (252 hrs)
4	Chemical Engineering (250)
5	Structural Biology (229 hrs)
6	Inst. Polymer Science (139 hrs)
7	Physics (74 hrs)
8	Schools/Demos (43 hrs)
9	Process Engineering (41 hrs)
10	NBI (32 hrs)
11	UWC (24 hrs)
12	Shimoda Biotech (23 hrs)
13	iThemba labs (22 hs)
14	Chemistry (20 hrs)
15	Geological Sciences (19.5 hrs)
16	Archaeology (19 hrs)
17	Liver Research (15.5 hrs)
18	Hatter Inst(15 hrs)
19	Civil Engineering (14 hr)
20	Saldanha Steel (12 hrs)



ELECTRON MICROSCOPES AND ASSOCIATED EQUIPMENT

LEO STEREOSCAN S440

Figure 4: Use of the Leica S440 SEM



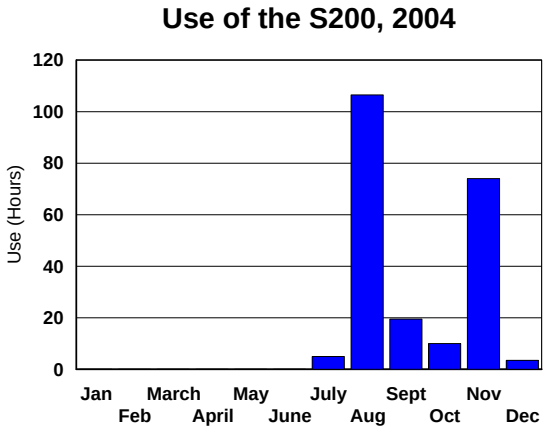
The S440 was used for a total of 478 hours, which is a decrease on the usage from 2003 (605 hours). Seventy six people from UCT made use of the instrument and there were 33 outside users. Although there were substantially more users on the S440, the number of hours the instrument used had decreased. The pattern indicates that the SEM was used to confirm or illustrate a small part of the research. The instrument was only down for approximately 5 days during the year, as a result of power cuts and power downs. The microscope was operated most of the year with a tungsten filament because the damaged IG pump power supply board was not replaced until March. Although the IG pump was working well, the screen was faulty which resulted in several total power downs and loss of vacuum. The tungsten filament was retained until November when a LaB_6 filament was refitted.

The upgrade of the S440 imaging system contemplated in the operational plan was seriously considered. It turned out that the upgrade would give us no noticeable performance enhancements and would cost more than R100,000. It was therefore decided not to proceed. The “upgrade” will however be essential should part of the imaging system on our microscope fail as both the hardware and software driving our

instrument are obsolete. It should be noted that the company which manufactured our instrument effectively no longer exists – Leica underwent a merger with, and subsequently a takeover by, Zeiss. Zeiss have introduced a new range of instruments and have a low level of commitment to the maintenance of the Leica designs. It was not possible to foresee this chain of events in 1994 when the instrument was purchased. At that time Leica was a rich company with apparently good prospects and good management.

CAMBRIDGE S200 SEM

Figure 5: Use of the Cambridge S200 SEM



The S200 was used in total for 219 hours, which is a large decrease in usage from 2003. One person used the EBSD and 2 people used the instrument for secondary electron imaging. The EBSD usage was low because the student had reached the end of his MSc and was writing up. New students were having problems with sample preparation and are expected to use the EBSD more in 2005. The instrument was down for 3 days because the joystick broke and for 5 days with a faulty power supply. The faulty power supply was replaced with one taken from the unused S200 in Centre for Materials Engineering.

JEOL 200CX TEM

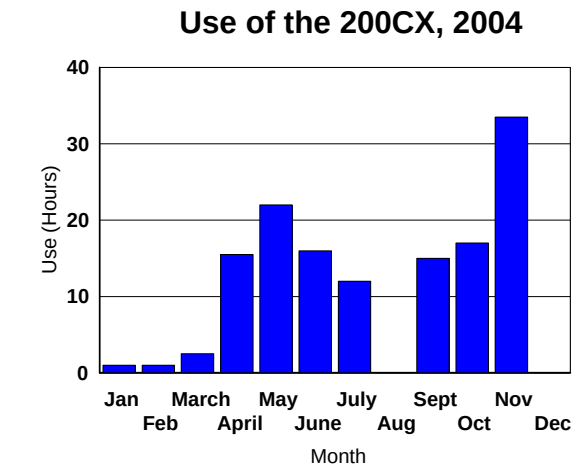
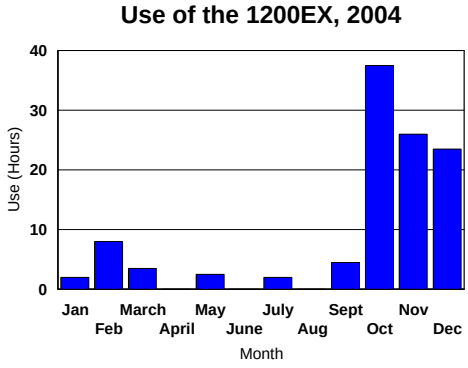


Figure 6: Use of the Jeol 200CX TEM

Use of the 200CX TEM was 135.5 hours, a slight increase in usage from 2003 (131 hours). It was used by 9 people from UCT. The low number of hours is partially due to the decrease in projects from Materials Engineering, and the introduction of the LEO 912 last year. The microscope's reliability is severely compromised by its age and it is gradually failing at a number of points. In spite of this, demand remains consistent as it is the only 200kV instrument that we have. Continued expensive maintenance of this instrument will remain imperative until funds for a new TEM of at least equivalent capability are found.

JEOL 1200EX

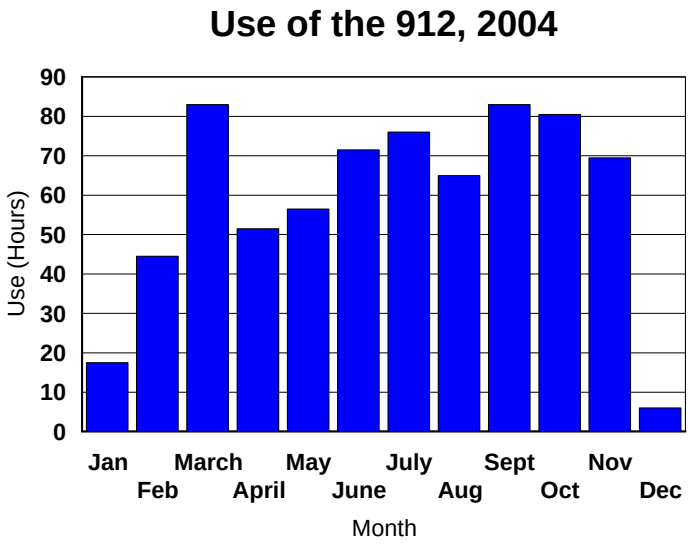
Figure 7: Use of the Jeol 1200EX TEM.



The Jeol 1200EX was fully operational all year and was used for a total of 110 hours, by 12 users from UCT. Although the main usage of this instrument remains the Structural Biology MSc students, it was used as a back up when the Leo 912 was down or fully booked.

LEO 912

Figure 8: Use of the LEO 912 TEM



This instrument was used for a total of 705 hours by 42 people from UCT and 16 outside users. It is proving to be the most popular instrument, used by a wide range of researchers. The primary reason for the instrument's popularity is the fact that it has a digital camera making it unnecessary to use film.

Significant additions were made to the basic instrument, namely, the addition of a differential pumping system (installed by Mr Marco Arienti in March), a LaB_6 filament, the installation of an absorbtion trap and the purchase of a cryo-holder. A cryo-transfer station was designed by Mr M. Jaffer and built by Mr D. Bolton. Significant problems were encountered with the cryo-holder and it was returned to the manufacturer (Gatan). It has now passed rudimentary performance tests but it has not yet done any real work.

A variety of problems relating to service issues were encountered. The ultimate resolution involved us signing a non-disclosure agreement with Zeiss and being supplied with full service information.

It has been necessary to replace a power supply, the fluorescent screen backing plate and a vacuum pump.

OTHER MAJOR EQUIPMENT

ULTRAMICROTOME

Use of the ultramicrotome was 229 hours, an increase over 2003 (203.5 hours). The departments of Pharmacology and Polymer science (US) used the cryo-ultramicrotomy facilities.

LIGHT MICROSCOPY

All the light microscopes and Zeiss Axiocam camera continue to be well used. The fluorescence microscope was mainly used by MCB students.

IMAGING CENTRE

This currently comprises four computers, Nikon and Leaf scanners for transparent material and an Epson flat bed scanner and two quality printers. The primary demand for scanning negatives arises from the Structural Biology group. The HP2000C printer continues to be popular and was used for printing several theses and plates for publications. The dye sublimation printer was not used during 2004 and we should consider discontinuing offering it as a service. The image processing and analysis hardware and software

has all been superseded and should also probably be considered obsolete. One computer is used to allow general users access to Adobe Photoshop. All the computers are old and the need to run a variety of ant-virus software on them compromises their performance significantly. Furthermore none of the computers have USB interfaces so users cannot take their data away on memory sticks.

MSSA 2004

MSSA annual conference was held in Pretoria. Prof Sewell and the Structural Biology MSc students attended the conference. UCT will no longer host the MSSA website but will continue to host the mailing list.

TEACHING AND EXTENSION

INDIVIDUAL TRAINING

Leo 912: 11 people (MCB – 4, Structural Biology – 3, Chem Eng, - 2, Pharmacology – 1, Shimoda – 1)
Jeol 1200EX: 5 people (Structural Biology – 3, Anatomical pathology – 1, Hatter Institute – 1)
Jeol 200CX: 3 people (Materials Engineering -2, Pharmacology – 1)
Leo S440: Four people from Human Biology and Chemical Engineering
Ultramicrotome: 9 people (Chem Eng -4, Polymer Sci (US) – 3, Pharmacology – 1, Liver Research – 1)

SCHOOL VISITS

Nine A Level students from Bishops visited in February, 3 A level students from the German School visited the Unit in March, 22 Grade 10 students from Heritage College visited in April and 40 Grade 11 Science students from the German School in August.

MICROSCOPY FOR BIOLOGISTS

The Microscopy for Biologists course was held in March and attended by 14 MCB honours students.

STRUCTURAL BIOLOGY MSC STUDENTS

Four coursework students from the Structural Biology Masters programme spent 2 weeks in the Unit in October. Their programme requires that they master the 1200EXII, the 912 and cryo-technique. In addition three students opted to do their projects in the EM Unit.

RESEARCH ACTIVITY

Research was generally carried out in collaboration with other departments and laboratories.
The following projects which depend on the initiatives of Unit members were active during 2004:

Studies of GroEL mutants

B.T. Sewell
The work on the structure of GroEL mutants in collaboration with Professor Helen Saibil at Birkbeck College in London was published in Nature Structural and Molecular Biology. The grant supporting this work has now terminated and the work has stopped.

Structure of the nitrilases from Bacillus pumilus, Pseudomonas stutzeri and Gloeocercospora sorghi
B.T. Sewell, B Price, N.R. Thuku and P Chang
The cyanide degrading enzymes are of potential industrial significance. We have solved seven structures at varying resolutions by single particle techniques and made substantial progress on the structure of the pH 5.4 fibrous form of the cyanide dihydratase from *B. pumilus.* Progress was made towards the creation of an atomic model on the basis of homology with two known structures. A grant to support part of this work has been obtained from the NRF.

Structure of the Glutamine Synthetase from Bacteroides fragilis
J. van Rooyen, B.T. Sewell, V. Abratt

The first phase of this project was completed with the determination of the low resolution structure of the enzyme. Mr van Rooyen graduated with his MSc. We will attempt to obtain a higher resolution structure using the microscopes in Birkbeck College during 2005. The project is funded by a grant from the NRF.

Characterisation of the neutralising epitopes of Human papillomavirus (HPV) type 16 and novel vaccine development using HPV as a vector for foreign epitope presentation.
Arvind Varsani, Mohammed Jaffer and Trevor Sewell

Major goals of this study are to characterise the immunodominant epitope of HPV-16 L1 that complexes neutralising Mab H16:V5 by 3D cryo-electron microscopy, determine the surface exposure of the cross neutralisation epitope of HPV-16 L2 in HPV-16 L1/L2 virus-like-particles (VLPs), study the effect of HPV-16 L1 C- and N-terminal fusion with green fluorescence protein (GFP) on virus-like particle assembly and study the effect of co-expression of HPV-16 L1 and L2 peptide (aa 396 - 439)/GFP fusion on VLP assembly. The various cloned required for this study have been prepared and expressed. We are currently optimising the VLP purification protocol. This project is funded by a junior reserach development grant from the Poliomyelitis research foundation and a start up grant from the URC.

PUBLICATIONS

Publications, for 2004, that resulted from research in which the EM Unit staff have been directly involved are listed:-

Sewell,BT, Best,RB, Chen,S, Roseman,AM, Farr,GW, Horwich,AL & Saibil,HR (2004). A mutant chaperonin with rearranged inter-ring electrostatic contacts,defective cooperativity, and temperature-sensitive dissociation of rings, Nature Structural and Molecular Biology,**11**,1128-1133.

Jandhyala,DM, Willson,RC, Sewell,BT and Benedik,MJ.(2004). Analysis of Three Microbial Cyanide Degrading Enzymes. Applied Microbiology and Biotechnology. 1432-0614 (Online) to appear in print in 2005

Tsekoa, T.L., Sayed, M.F., Cameron, R.A., Sewell, B.T. and Cowan D.A. (2004) Purification, crystallization and preliminary X-ray diffraction analysis of thermostable nitrile hydratase. South African Journal of Science, **100**, 488-491.

Published Conference Proceedings

J.M.van Rooyen, V.R. Abratt and B.T. Sewell. Three-Dimensional structure of a type III glutamine synthetase by a single particle reconstruction

Publications by Users of the Unit

The following list includes those papers given to the Unit by users. It is unfortunately not a complete list of published work that has been conducted in the Unit. A great deal of the work done by users is published only as conference proceedings, such work is not reflected here.

Egan T, Rodgers, A and Siele, T. 2004. Nucleation of calcium oxalate crystals on an imprinted polymer surface from pure aqueous solution and urine. *J. Biol. Inorg. Chem* 9 195-204.

Farrant, J.M., Bailly, C., Leymarie, J., Hamman, B., Come, D and Corbineau, F. 2004. Wheat seedlings as a model to understand desiccation-tolerance and -sensitivity. *Physiologia Plantarum* 120, 563-574

Knutsen, R.D., C I Lang and J A Basson, 2004. Discontinuous cellular precipitation in a Cr-Mn-N steel with niobium and vanadium additions, *Acta Materialia* 52, 2407-2417

Lewis, A.E, van Hille, R., Nathoo, J and S. Seewoo, 2004. Prevention of calcium sulphate crystallisation in water desalination plants using Slurry Precipitation and Recycle Reverse Osmosis (SPARRO), *Water Research Commission, Private Bag, X03, Gezina, 0031, South Africa.*

Lewis, A.E. and Hounslow, M., 2004. Understanding factors influencing nickel morphology, *Mineral Processing 2004*, pp. 76

Moore, J.P., Ravenscroft, N., Lindsey, G.G., Farrant, J.M. And Brandt, W.F 2004. The predominant polyphenol in the leaves of the resurrection plant *Myrothanmuns flabellifolius*, 3, 4, 5 tri-O-Galloylquinic acid, protects membranes against desiccation and free radical induced oxidation. *Biochem J*. 385, 301-308

Seewoo, S., van Hille, R., and Lewis, A.E., 2004. Aspects of gypsum precipitation in scaling waters, *Hydrometallurgy*, 75, Nov, 135-146

Taty -Costodes ,V. C. and Lewis, A.E., 2004. Aggregation of nickel carbonate in a fluidised bed reactor, *Mineral Processing 2004*,pp. 75

Vander Willigen C., Mundree, S.G., Pammenter, N.W. and Farrant, J.M.2004. Mechanical stabilisation in desiccated vegetative tissues of the resurrection grass *Eragrostis nindensis*: does an alpha TIP and/or subcellular compartmentalization play a role? *J. Exp. Bot*. 55, 651-661.

Vicre, M., Farrant, J.M. and Driouich, A. 2004. Insights into the mechanisms of desiccation tolerance among resurrection plants. *Plant Cell and Env*, 27, 1329-1340.

Vicre, M., Lerouxel, O., Farrant, J.M., Lerouge, P., and Driouich, A. 2004. Composition and desiccation induced alterations of the cell wall in the resurrection plant *Craterostigma wilmsii*. *Physiologia Plantarum* 120, 229-239.

Zhang, Y. and Lewis, A.E., 2004. Real world complications in the measurement of particle size, *Mineral Processing 2004*, pp. 93

PhD Theses

Adair, Robin, Zoology: Seed-reducing Cecodoyiidae as potential bilogical control agents for invasive Australian wattles in South Africa, particularly *Acaia mearnsii* and *A. cyclops*.

Allie, Shameez, Chemistry: The effects of calcium, magnesium and citrate health supplements on urinary risk factors for calcium oxalate kidney stone formation.

Balasundaram, Bangaru, Chemical Engineering: A detailed investigation of microbial cell disruption by hydrodynamic cavitation for selective product release.

Botes, Lizeth, Zoology: Taxonomy, distribution and toxicity of dinoflagellate species in the Southern Benguela current.

Craig, Tracy-Ann, Chemistry: Kidney stone rarity in South Africa's black population: Investigation of the biochemical and physico-chemical properties of Tamm Horsefall mucoprotein as a possible contributory factor.

Griffin, Neil, Botany: Harvest ecology and biodiversity of South African porpyhria

Habanyama, Adrian, Physics: Interaction of germanium with platinum group metals in lateral diffusion couples.

Matiru, Viviene, Molecular and Cell Biology: An assessment of rhizobian infection, metabolite release and growth response in agriculturally-important legume and cereal crops.

Nzula, Miyelani, Materials Engineering: Order hardening in platinum chromium alloys

Ochala, Robert, Mechanical Engineering: Investigation of strain rate sensitivity of polymer matrix composites.

Pauw, Anton, Botany: Variation in pollination across a fragmented landscpe at the Cape of Africa

Scott, Allan, Civil Engineering: The influence of binder type and cracking on reinforcing steel corrosion in concrete.

Spriggs, Amy, Botany: Symbiotic N2 fixation in *Cyclopia* vent. Spp. (honeybush): towards sustainable cultivation in the Western Cape of South Africa.

Tronchin, Enrico, Botany: The systematics, biology and distribution of the *Gelidiceae* (Rhodophyta) of South Africa and related taxa.

Van Zyl, Andre, Institue of Polymer Science, US: Synthesis, characterization and testing of nano-structured particles for effective impact modification of glassy amorphous polymers

Walden, Jason, Pharmacology: Characterisation of mefloquine accumulation in Plasmodium falciparum.

MSc Theses

Botha, Subelia, Chemistry, UWC: Nanostructured catalysts for hydrogen production synthesis, supporting and testing.

Codron, Jackie, Botany: An isotope comparison of elephant (*Loxodonta africana*) diets in the kruger park and Welgevonden game reserve.

Klaas, Nkosana, Materials Engineering: The tribological behavior of glass filled polytetrafluoroethylene (PTFE) under dry and water lubrication.

Maxakato, Wendy, Chemistry UWC: Preparation and characterization of inorganic proton conducting membranes based on zirconium phosphate for application in direct methanol fuel cell (DMFC).

McPherson, Chemical Engineering: I-Hexene purification via selective catalytic hydrogenation.

Mwase, Webster, Chemistry, UWC: Zirconium phosphate membranes for hydrogen separation.

Netangaheni, Phumudzo, Materials Engineering: An investigation of the failure mechanisms of thermoplastic composities at various rates of strain and temperatures.

Siele, Tewolde, Chemistry: Crystallization of calcium oxalate on molecularly imprinted polymer surfaces.

Waggie, Fazlin, Chemistry: The synthesis, characterization and activation of some multinuclear catalyst precursors for olefin polymerization.

Zwane, Seneliso, Chemical Engineering: Vanadia promoted Co-Al_2O_3 Fischer-Tropsch catalysts

FINANCE

Details of the Unit's accounts are presented in Table 2.

OTHER MATTERS

LEAVE BY THE DIRECTOR

The director was away for three weeks during May to attend the Second International Tomography Conference. He also spent a few days at Texas A&M working with Professor Michael Benedik and several days in England collecting high resolution data of Glutamine synthetase using the cryo-FEGTEM at Birkbeck College. Several local trips were made by the director to advertise the Structural Biology Programme in Bloemfontein, Pietermaritzburg, Grahamstown, Pretoria, Johannesburg and Polokwane. He attended the Royal Society / NRF joint programme conference in Pretoria and the 2004 meeting of the Microscopy Society of Southern Africa in Pretoria.

SERVICE TO INDUSTRIAL AND OTHER EXTERNAL USERS

The Unit offers its facilities on an ad hoc basis to external users. Clients exploiting these services during 2004 were: Atlantis Foundries, De Beers, Fine Chemical Corporation, Intermet Africa, iThemba Labs, National Botanical Institute, One Eighty Degrees, Patterson and Cooke, Pfizer, Saldanha Steel, Shimoda Biotech, Tyco International. These clients almost exclusively use the S440 SEM and the 912 TEM and together accounted for 98 hours instrument time.

VISITORS TO THE UNIT

Dr.Mike Lawrence, Dr.Gwen Nneji, Dr E Orlova, Dr M.J.Benedik and Dr E Egelman all visited the Unit during the year.

SUMMARY

The Unit had another very good year contributing to 16 PhD theses and 10 MSc theses and completing major work associated with both NRF and Wellcome Grants. The Zeiss EM912 is proving to be of considerable value but it has yet to prove itself to be a usable cryo-TEM. The resignation of Dr Price was a considerable setback but the Unit was fortunate in being able to find Dr Weber to replace him.

Prepared by: Associate Professor B.T. Sewell
Director

TABLE 1

Services Offered by the Unit during 2004

Service	Comment
Access to 200CX TEM	Used by 9 people
Access to 1200EX TEM	Used by 12 people
Access to S440 SEM	Used by 109 people
Access to S200 SEM	Used by 3 people
Access to 912 TEM	Used by 58 people
Training on 200CX	3 new users were trained
Training on the 1200EX TEM	5 new users were trained
Training on S440 SEM	4 new users were trained
Training on the 912 TEM	11 new users were trained
Access to Ultracut S Ultramicrotome	Used by 21 people
Training on Ultracut S	9 new users were trained
Cryo-microtomy and immunolabelling	Well used
Sectioning of blocks supplied by the user	Well used
Embedding of biological specimens in methacrylate and epoxy	Well used
Freeze substitution	Used
Sputter Coating of specimens supplied by user	Very popular service
Critical point drying of specimens supplied by the user	Very popular service
User access to darkroom facilities	Not used, will be discontinued
Printing of EM films	Service used
Access to optical microscopy facilities	Used
Access to Image Analysis (GENIAS)	Not used, will be discontinued
Access to Image Processing and Analysis (Visilog)	Not used, will be discontinued
Element analysis by EDS	Well used.
"Introduction to EM for Biologists"	This course was held once.
Access to specimen polisher	Used
Access to high vacuum coating plant and accessories	Adequately used
Store of EM consumables	Used by most users
Access to prep lab	Well used
Collection of books and journals on microscopy	Used
Vacuum Leak Detection	Broken in 2004, repaired in 2005
Production of CD ROMS	Used
Digitization of transparent media on LS4500	Used
Dye sublimation printer	Not used, will be discontinued
High quality ink-jet printer	Very popular
Flat bed scanner	Well Used
Liquid Nitrogen sales	Popular

Table 2

Eelectron Microscope Unit 2004		Operating 000516	External Services 001258	Equipment 170025	Consumables 000933	Maintenance 000995	Total
Opening Balance		9240	232344		44739	40163	326485
Surplus/(Deficit) for the year		44188	9364		(10827)	118309	519283
Income		96414	71615	586329	55167	171976	981501
Expenditure		(52226)	(62251)	(228079)	(65994)	(53667)	(462217)
Closing balance		**53428**	**241708**	**358249**	**33912**	**158472**	**845769**
Income							
Grant Transfers		96414					96414
Budget allocation				586329			586329
Internal					50167	171976	222143
External recoveries			71615				71615
Sales revenue					5000		5000
Total		**96414**	**71615**	**586329**	**55167**	**171976**	**981501**
Expenditure							
Staffing		1843	1120			911	3874
Admin/Operating	Tel, Postage, fax	16883	1841		240	2287	21251
	PC Consumables	2131	460		6309	650	9550
	PC Components	710		7011	1805	280	9806
	Photocopying/Printing	2467					2467
	Stationery	1677			2392	260	4330
	Travel	7554				1100	8654
	Cleaning	61			356		417
	Utilities	5174			18731	1921	25826
	Materials and Cons	6983	13182		36160	6273	62598
	Petty cash	1422	800			186	2408
	Insurance		842				842
	Repair & Maintenenace	1461	44006			38842	84310
	Minor Equipment	3860		67181		956	71998
Furniture/Equipment				57473			57473
Grant Transfer				96414			96414
Total		**52226**	**62251**	**228079**	**65994**	**53667**	**462217**

2004 User list
*indicates Microscope users

Agricultural Research Council		
Disease Management		
	Howell, Cicelia	Staff*
Weed Pathology	Lennox, Cheryl	Staff*
Anatomical Pathology		
	Sutheraland, J	MSc*
Archaeology	De Villiers, Sue	Staff*
	Miller, Duncan	Staff*
	Rosenstien, Dana	PhD*
Atlantis Foundries	Mnsini, Ernest	Staff*
Botany	Aguilar, Gonzalo	Staff
	Hedderson, T	Staff
	Pauw, Anton	PhD*
	Verboom, T	PhD
Cape Technikon,		
Dept Chem Eng	Kholofela, K	Mtech*
	Small, Hannelina	Staff*
Cape Heart Centre	Samodien, Nazlia	Staff*
Centre for Materials Engineering		
	Carelse, Muneeba	MSc*
	Edmond	Hons*
	Fotoyi Ziyanda	Hons*
	Husemeyer, Victoria	Hons*
	Jackson, Kamili	Staff*
	Knutsen, Rob	Staff*
	Levy, S	Hons*
	Miller, Duncan	Staff*
	Moerat, Nazeeba	Hons*
	Moumakwa, Donald	MSc*
	Ntombi, M	Hons*
	Nzula, M	PhD*
	Parker, Sa-adat	Msc*
	Park-Ross, Penny	Staff*
	Silethelwe, Nxumalo	MSc*
	Tlharipe, Lerato	Hons*
Chemistry	Egan, Tim	Staff*
	Linder, Peter	Staff*
	Makhadzi, P	MSc*
	Tshivase, M	MSc*
Chemical Engineering		
	Baskhuizen, David	MSc*
	Claeys, Michael	Staff*
	Custoides, Taty	Staff*
	Fei, Yi	Staff*
	Hove, M	PhD*
	Johnston-Robertson,M	MSc*
	Kefilwe, P	Staff*
	Kleinscmidt Jaques	MSc*
	Mabaso, Itai	PhD*
	Mboneni, M	MSc*

	Modutwane, Angel	MSc*
	Mugubane, Thembi	PhD*
	Msimang, Velaphi	PhD*
	Nathoo Jeetan	PhD*
	Newell, Andrew	Staff*
	Parolis, Lesley	Staff*
	Popp Alexander	MSc*
	Prins, Reagan	Hons*
	Qi Zhuang	PhD*
	Raja,Sashnee	PhD*
	Sauerbeck, Silke	Staff*
	Taty Christain	PhD*
	Vengadajellum, C	PhD*
	Velaphi, P	MSc*
	Viljoen, Elvera	PhD*
	Welker, Cathrin	PhD*
	Zizhou, Njodzi	PhD*
Civil Engineering	Fourie, Clyde	PhD*
	Gardner, Tom	PhD*
De Beers	Vietti, Andrew	PhD*
Dermatology	Khumalo, E	Staff*
Fine Art	Goldswain, Lucy	Hons*
Fine Chemical Corporation		
	Jacobs, Pauline	Staff*
	Liebenhagen, Engela	Staff*
Geological Sciences	Bisnath, Avi	PhD*
	Compton, John	Staff*
	Herbert, Caryn	Hons*
	Netshitungulwana R	PhD*
	Smith, Meris	PhD*
Hatter Institute	Chan, A	MSc*
Human and Cell Biology		
	Mgweba,Thandi	PhD*
	Napier, Hugh	MSc*
InterMet Africa	Frans, Hilton	Staff*
iThemba Labs	Barnabas, P	Staff*
Liver Research	Binder, A	MSc*
Maths	Bruyns, Peter	Staff*
Medical Biochemistry		
	Gordon A	PhD*
	Thilo, Lutz	Staff*
Medical Virology	Mgweba, Thandi	Staff*
Molecular and Cell Biology		
	Aderito	MSc*
	Bailley, C	MSc
	Becker, Inga	Staff*
	Cooper, Keren	Staff*
	Doeschate, Kim	PhD*
	Edward Lin	MSc*
	Farrant, Jill.	Staff
	Halsey, Richard	MSc*
	Hunt, Brian	Staff*
	Kohl, Thomas	PhD*

	Learmont, J	Hons*
	Lin, Edward	MSc*
	Macey, Brett	PhD*
	Meyers, Paul	Staff *
	Moore, John	MSc*
NBI	Kurzweil, Hubert	Staff*****
Oceanography	Bernard, Stuart	PhD
	Waldron, Howard	Staff
One Eighty Degrees	Basson, Janet	Staff*
Patterson and Cooke	Myburg, H	Staff*
	Thabiso	Staff*
Pfizer	Delport, F	Staff*
Pharmacology	Webber, B	MSc*
Physics	O Ayodele	PhD*
	Capito, Sophia	Hons*
	Minani Evariste	MSc*
	Schadrack	MSc*
	Topic, Mira	Staff*
	Tshepo	MSc*
	Ramukosi, F	MSc*
	Sigeau Ziyanda	MSc*
	Thovhogi, Tshilidzi	PhD*
Public Health	de Water-Naudi, P	Staff*****
Saldanha Steel	Baard, Annalize	Staff*
	Schlettwein, Natasha	Staff*
Shimodo Biotechnology		
	Tiedt, Fritz	Staff*
Structural Biology	Ndoriah Robert	MSc*
	Frouws, Tim	MSc*
	Varsani, Arvind	Staff*
	van Rooyen Jason	MSc*
Tyco International	Silver-Vallance, Matthew	Staff*
University of Stellenbosch		
Chemistry	Buica, A	PhD*
	Van Zyl,P	PhD*
Inst. Polymer Science		
	Cloete Valeska	PhD*
	Ganeva, Dessi	Staff*
	Greyling, Corinne	PhD*
	Hermaunt, M-C	PhD*
	Higham, Lawrence	PhD*
	Kriel,H	MSc*
	McLeary, James	PhD*
	Mesuli	MSc*
	Seboa, S	Staff*
	Smit, Eugene	MSc*
	Staich, Ingrid	MSc*
	Swanepoel, Francois	Staff*
	Vatta, Lara	PhD*
Process Engineering		
	Banda, Wezi	MSc*
	Greef, Freddy	Staff*
	Van Vuuren, P	MSc*

	Van der Spuy, R	MSc*
University of the Western Cape		
BCB	Baker, J	Staff*
	Lewis, Ceri	Staff*
Chemistry	Klink, Michael	MSc*
	Mokrani, Touhami	PhD*
	Mungulisi	MSc*
	Shan, Ji	MSc*
	Tankiso, Zimboneni	MSc*
Virology	Campos, W	MSc*
	Kohl, Thomas	PhD*
Zoology	Branch Margo	Staff*
	Dorchin, Netta	PhD*

* Microscopy Users (148)
6 non EM users
154 total

UNIVERSITY OF CAPE TOWN

FINANCE DEPARTMENT
Level 3, Bremner Building
University of Cape Town, Private Bag Rondebosch, 7701
Telephone: (021) 650 2217/8; Fax: (021) 650 5124
Website: http://www.uct.ac.za

Memorandum – Electron Microscope Unit (2005 onwards)

Dear Cheryl, Daya and Trevor,

A few brief points follow, which serve to confirm the outcome of our most productive meeting on Saturday 21 August 2004. These are:

- From the 2005 year onwards, the Electron Microscope Unit (EMU) will fall into the grants category on the UCT budget;
- The grant base year will be the operational continuing budget that has been submitted for the 2005 year (amounting to R1,526,147), adjusted for PASS salaries which may be impacted by the remuneration review being carried out by the HR Department;
- Post the 2005 year, the grant will increase by the target expense rate set by the University Finance Committee, the Director of Finance and DVC Planning and Budgeting as part of the budget process each year;
- The EMU will continue to be serviced and assisted by the Science faculty where needed, at the discretion of the Dean of Science and DVC Research;
- By becoming part of the grants process, the EMU will not be excluded from the budget process and may make application for granting of capital expenditure, in competition with the rest of the UCT community;
- The EMU will still have to produce an annual budget for its internal management processes and for the EMU committee. A copy of this budget should also be lodged with the Manager: Financial Information Management and the DVC Research for their information and records. Failure to do this could result in the withholding of the grant for the subsequent years.

I think the points above about cover it. Please let me have any comments and/or corrections by Friday 3rd September 2004.

Lastly, Daya and Trevor will let me have a motivation to take to the University Finance Committee (UFC) in respect of an application for contingency funding for the 2004 budget shortfall that arose due to a budgeting error. This meeting is to take place on 17th September 2004 which means I need the document before 10th September 2004.

Thanks and regards,

Hardy