ELECTRON MICROSCOPE UNIT

ANNUAL REPORT

2001

Director	**B.T. Sewell**
Chief Technical Officer (Part Time)	**J. Duncan**
Chief Technical Officer	**M.A. Jaffer**
Chief Scientific Officer	**B. Price**
Senior Technical Officer	**M. Waldron**
Photographic Assistant	**W. Williams**

July 2002

TERMS OF REFERENCE

(a) To advise the Equipment Committee (EC) and through it the University Research Committee (URC) on provision of electron microscopy services to the University's teaching and research community;
(b) to receive, and report to the EC and URC on the annual report, strategic plan, and operational plan of the Director of the Electron Microscope Unit (EMU).

PROCEDURES

(a) The EMU is a University facility. It receives its budget through the URC and the EC. For administrative convenience only the financial administration of the EMU is handled by the Science Faculty Office (but the financial reports of the EMU form part of the overall financial report of the EC and the URC, and not of the Science Faculty).
(b) The EMU Committee (EMUC) is established in the Research Cluster. The Chair of the EMUC submits an annual report to the Chair of the EC, who in turn submits a consolidated annual report to the Chair of the URC. These reports are the vehicles for accounting for the work of the EC and EMUC respectively and for this reason these reports must indicate what the EMU and the EMUC have achieved relative to agreed goals and place the URC chair in a position to judge how well the EMUC has performed.
(c) The Chair of the EMUC, acts as the line manager for the Director of the EMU.

HIGHLIGHTS OF 2001

INSTALLATION OF JEOL 1200EXII IN THE ELECTRON MICROSCOPE UNIT

The JEOL 1200EXII, awarded by the Wellcome Trust in terms of the existing Collaborative Support Grant to Professor H. Saibil (Birkbeck College, London) and B.T. Sewell, was transported to Cape Town and installed in the E.M.Unit in February 2001 by Mr Dieter Geppert of ARL.

APPLICATION TO THE WELLCOME TRUST TO PURCHASE OF NEW TRANSMISSION ELECTRON MICROSCOPE

The application to the Wellcome Trust for the purchase of a new TEM and high pressure freezer was resubmitted after taking the referees comments into account. The proposal was based on projects from Dr T. Egan, Prof. E.P. Rybicki and Prof S. Kidson.

APPLICATION TO THE CARNEGIE CORPORATION OF NEW YORK FOR FUNDING FOR A JOINT UWC/UCT MASTERS PROGRAMME IN STRUCTURAL BIOLOGY

A proposal for USD1.09m was prepared to fund the establishment of a joint UCT/UWC masters programme in Structural Biology. The students will be registered for two years and will do a year of coursework and a year of research. The course will be concerned with the determination of structure of objects ranging from macromolecules to cells. Twelve UCT and three UWC academics are involved in the programme which also involves the National NMR facility at Stellenbosch. The grant will fund two posts, student bursaries and student running expenses for three years an X-ray system, enhancements to the NMR facility to enable it to run proteins and 22 computers.

STAFF APPOINTMENTS AND PROMOTIONS

Dr Brendon Price assumed his duties as Chief Scientific Officer on 2 May 2001. He has considerable expertise in many aspects of biological electron microscopy and has taken responsibility for project directed work in this area. He has also taken over many administrative jobs from Mrs Waldron who in turn assumed total responsibility for the SEM service.

Mr Jaffer was promoted to Chief Technical Officer and will retain responsibility for the day to day running of the TEMs and associated instrumentation.

MEETINGS OF THE ELECTRON MICROSCOPE UNIT ADVISORY BOARD

A meeting of the EMU Advisory Board was held on 13 June 2001. Those attending were Professor D. Reddy (Chairman), Professors L. Nassimbeni, G. Kotwal, Associate Professors E.P. Rybicki, R. Knutsen and B T Sewell, and Mrs M. Waldron. The meeting approved the 2000 annual report and discussed substantial modification to the EMU strategic plan proposed by Professor Sewell. In essence, the proposal was that the Unit would move away from short term service work towards being an equal partner in research and postgraduate training. Coupled to this was a proposal to change the funding and charging

structure which would better ensure the sustainability of the Unit than the existing structure. It was decided to put the proposal to the users of the Unit and canvass their opinion - this was done on the 31 July. Although the substance of the strategic plan found favour with many users the proposal to move to a realistic charging structure did not and it was decided to retain the current structure, increase charges and attempt to forge partnerships with key researchers in order to bring in funding.

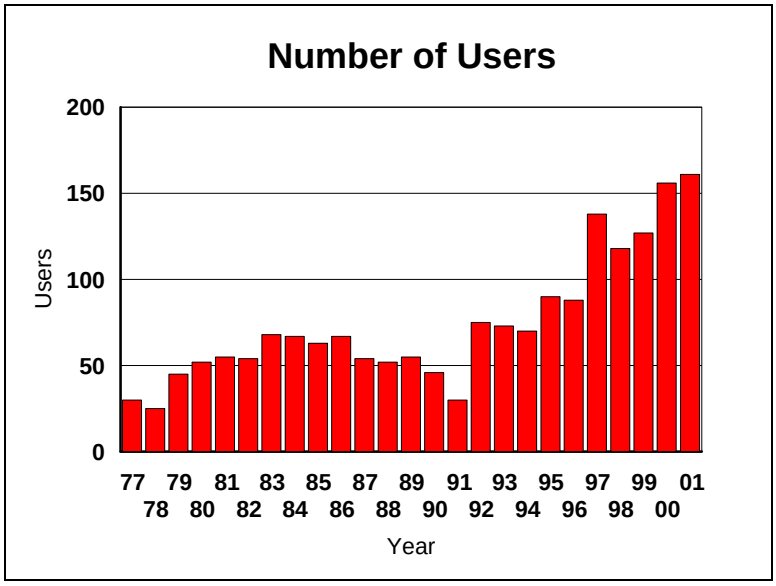
MAJOR EQUIPMENT PURCHASES IN 2001

The following capital items were purchassed: components for a cryo-holder pumping station, an electrophoresis system, liquid nitrogen dewars, freeze substitution equipment, upgrade of most of the PCs, thermohygrometers, humidifier, deuterium lamp, chromatography column. The acquisition of freeze substitution equipment was motivated by the needs of Prof Jill Farrant; this is key new technology required for studies in most areas of modern cell biology.

USE OF THE UNIT

Services provided by the Unit during 2001 are listed in Table 1. Increased usage was made of all key services of the Unit, however production of slides and the user darkroom were not used and these services will be terminated. The user darkroom will be re-deployed as a store-room.

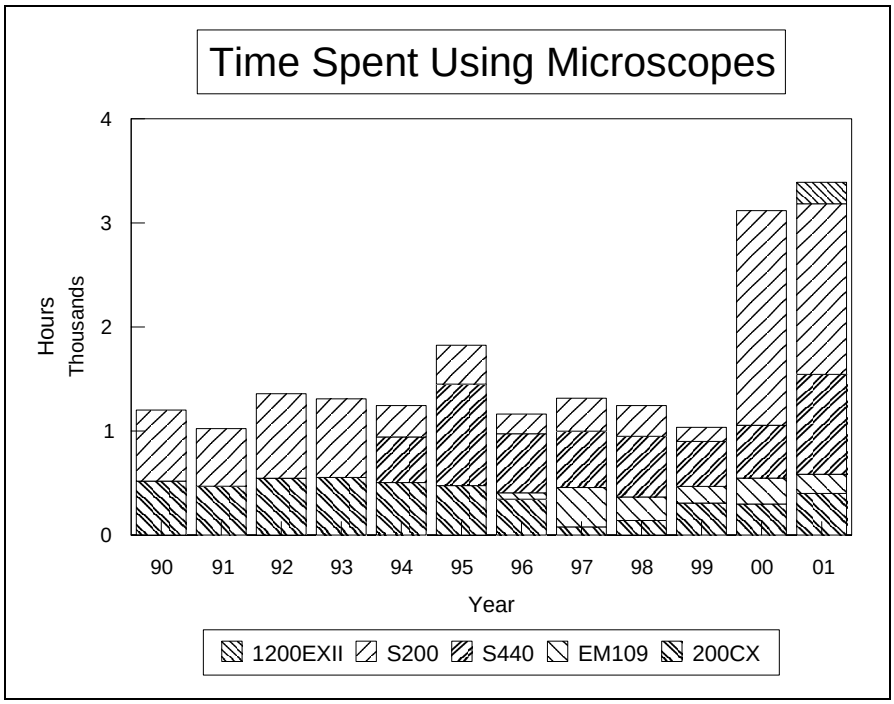
Figure 1: Number of users of microscopy facilities per year since 1977.



One hundred and sixty people made use of the microscopy services of the Electron Microscope Unit in 2001. In addition, a further 20 users utilized services other than those related to microscopy, notably the Imaging Centre and CD writing facilities. The Imaging Centre continued to be heavily used by EM Users.
The names and departments of the users are listed in Table 7.

Total time spent using the Unit's microscopes was 3184 hours in 2001 which is a small increase on last year. The increased use is mainly due to the installation of the 1200 EX TEM as well as an increased usage of the 200 CX TEM and the S440 SEM. TEM usage rose by 44% from the 2000 figures.

Although use of the EBSD system decreased slightly, total SEM usage remained similar to last year.



..

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

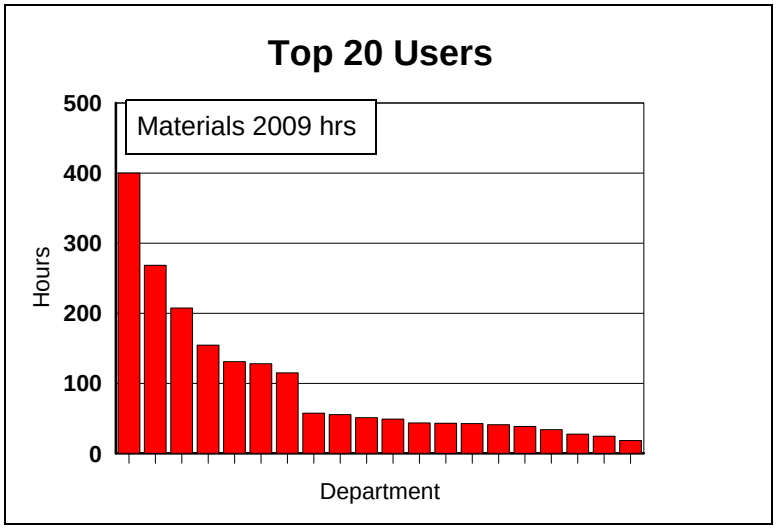


Figure 3: Microscope usage by department, institution or company

Order is as follows:

1	Materials Engineering	11	Human Biology
2	MCB	12	NAC
3	Zoology	13	WITS
4	University of Stellenbosch	14	Namakwa Sands
5	Chemical Engineering	15	Medical Microbiology
6	Geological Sciences	16	Archaeology
7	Virology	17	Anatomical Pathology
8	Pharmacology	18	UWC
9	Medical Biochemistry	19	NBI
10	Botany	20	Chemistry

ELECTRON MICROSCOPES AND ASSOCIATED EQUIPMENT

LEO STEREOSCAN S440

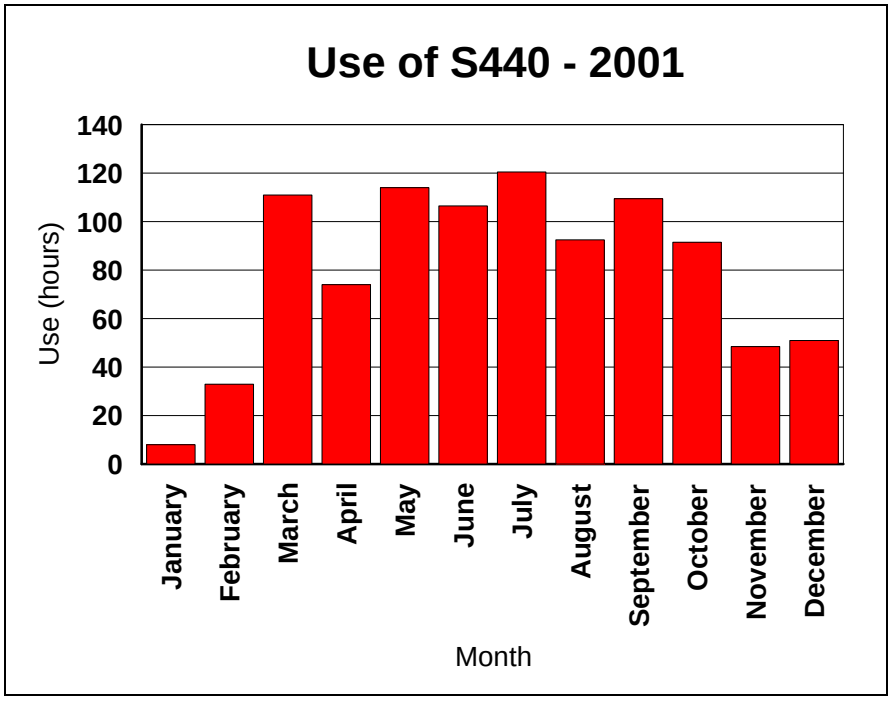


Figure 4: Use of the Leica S440 SEM.

The S440 was used for a total of 960 hours which is a 90% increase on the usage for 2000. Sixty nine people from UCT made use of the instrument and there were 31 outside users. Use of this instrument remains the most popular service rendered by the Unit. Due to user error, the ion getter pump was damaged and needed replacement at a cost of approximately R20,000, which will be reflected in 2002. The instrument has remained operational but with degraded facilities during the six months it has taken to effect the replacement.

CAMBRIDGE S200 SEM

The S200 was used in total for 1639.5 hours, which is a slight decrease in usage from 2000. Five people used the EBSD and ten people, two of whom were not from UCT, used the instrument for secondary electron imaging. The instrument worked reliably. The Orion computerised image capture system continued to work well. A chamber scope connected to a monitor was installed in the system to allow users to see their specimens in relation to the dectectors when the chamber door is closed.

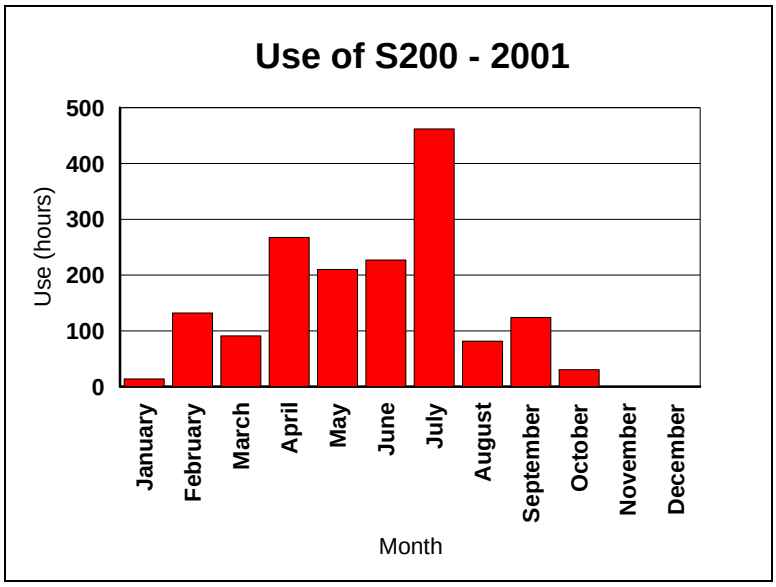


Figure 5: Use of the Cambridge S200 SEM.

JEOL 200CX TEM

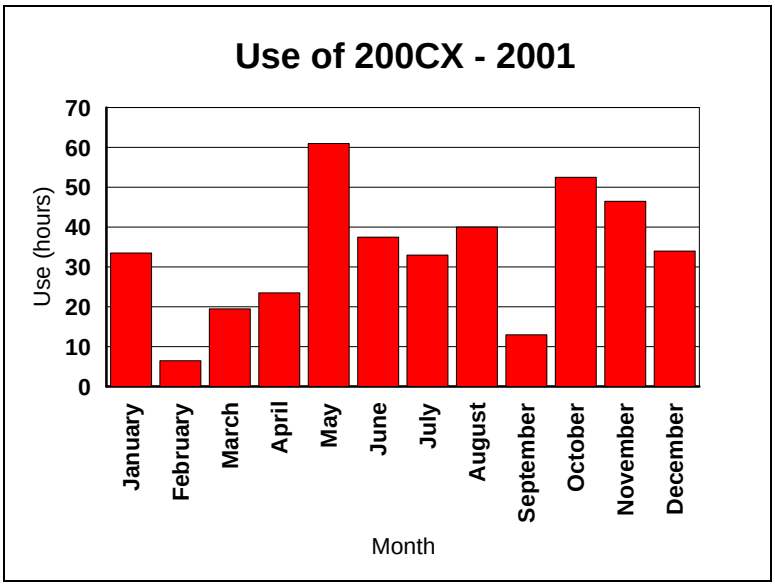


Figure 6: Use of the Jeol 200CX TEM**.**

Use of the 200CX TEM rose to 400.5 hours, a 34% increase in useage from 2000. It was used by 28 people from UCT and 7 outside users. The instrument continues to operate as our prime TEM.
Its reliability is severely compromised by its age and it is gradually failing at a number of points. In spite of this demand remains high. Continued expensive maintenance of this instrument will remain imperative until funds for a new TEM of at least equivalent capability are found.

ZEISS EM109 TEM

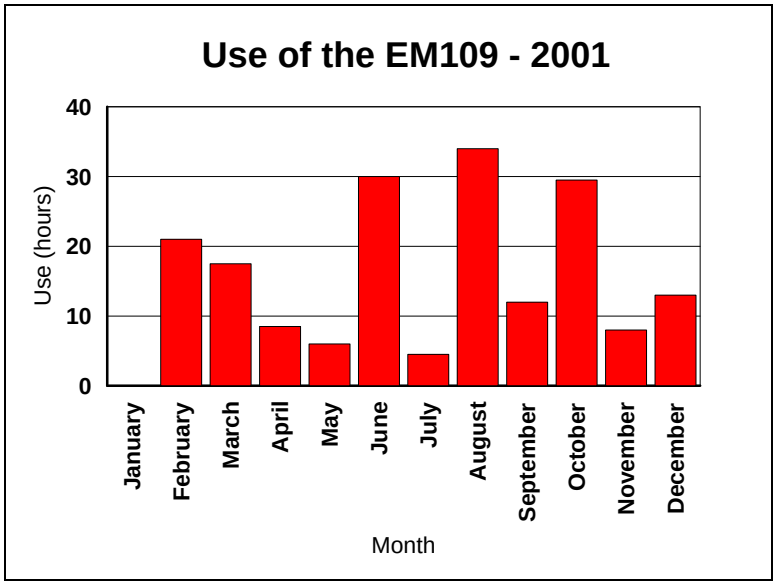


Figure 7: Use of the Zeiss EM109 TEM.

Use of this instrument decreased slightly to 184 hours. It was used by 13 people from UCT and 6 outside users.

JEOL 1200EX II

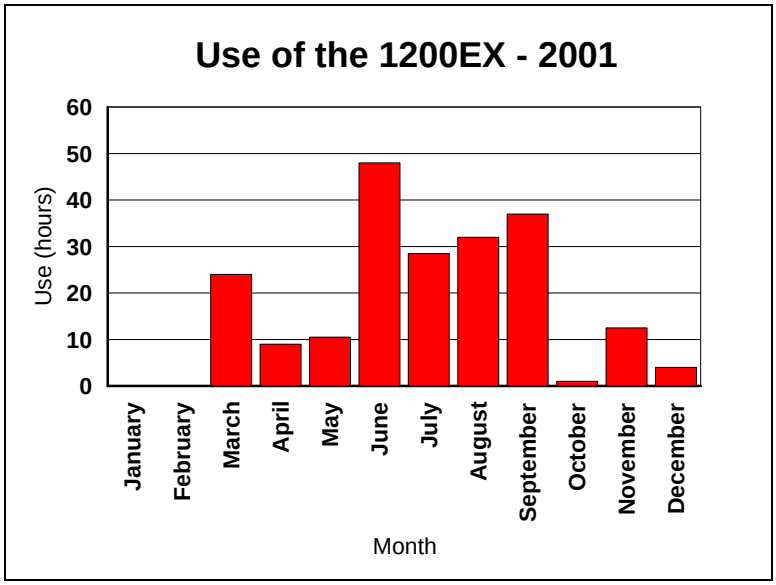


Figure 8: Use of the Jeol 1200EX TEM.

The Jeol 1200EX was fully operational by March 2001. It was used for a total of 206.5 hours, by 10 users from UCT and 2 outside users. This instrument was used mainly by the E.M.Unit and Mark Berman for his MSc.

OTHER MAJOR EQUIPMENT

ULTRAMICROTOME

Use of the ultramicrotome was 277.5 hours which is a small increase on its use during 2000. The departments of Biochemistry, Medical Biochemistry, Medicine, Microbiology, Medical Microbiology and Chemical Engineering used the cryo-ultramicrotomy facilities.

LIGHT MICROSCOPY

The Nikon inverted epifluorescence microscope which was moved from the Biochemistry department was used extensively in conjunction with the Zeiss Axiocam. The optical cathodoluminescence facilities continued to be used for the study of diamonds by students from the Geology department. The Hoffman phase contrast microscope was used regularly for the otolith research projects.

IMAGING CENTRE

The imaging centre continued to be popular for printing and scanning slides and negatives. The HP2000C printer had a high usage and was used for printing several theses.

THE ELECTRON MICROSCOPE UNIT BRANCH IN THE INSTITUTE OF MOLECULAR MEDICINE

The proposal that the branch of the EMU and staffed by a technical officer responsible to the Director of the EMU has not advanced significantly. However the layout of the EM suite was designed and submitted via Professor Parker to architects for inclusion in their planning. A problem in planning further is that clarity has not been achieved on the nature and funding of projects to be carried out in this facility. Professor Janse van Rensburg at Stellenbosch University Medical School reversed her offer to sell the Philips CM12 instrument which they seldom use. The implementation of the plan requires funding for one additional staff member and for equipment. The nature of the equipment would follow from a clear definition of projects but the current wish list includes: A second hand electron microscope, high pressure freezer, ultramicrotome, film scanner and computer facilities. The total estimated equipment cost is in

excess or R3m. The director is not aware of the details of any arrangements being made to secure these funds.

TEACHING AND EXTENSION

USER COURSES

The five day intensive course aimed at honours and post graduate students, "Introduction to Microscopy for Biologists" was held for the MCB honours students from 23.4.2001-27.4.2001 and a truncated version was held for the Human Biology honours students from 2.4.2001 - 5.4.2001

SCANNING ELECTRON MICROSCOPY COMPUTER BASED COURSE

A comprehensive course on scanning electron microscopy previously delivered as SEMSchool has been revised and made available through our website. The work to accomplish this was done by Mr Price, Mrs Waldron and Professor Delpierre. Although it has not yet reached its final form the course has attracted several international enquiries.

INDIVIDUAL TRAINING

Two users from the departments of Virology and Polymer Science (University of Stellenbosch) were trained to operate the 200CX, four new users from the departments of Botany, Medical Microbiology,NAC and Pharmacology were trained to use the EM109, eight students from Materials Engineering, Zoology, Namakwa Sands, Geology (University of Stellenbosch), Geological Sciences and Chemistry were trained to operate the S440. Two new users from the departments of Chemistry and Materials Engineering were trained to use the S200 and 11 new users from the departments of Botany, Medicine, NAC, Polymer Science (University of Stellenbosch), Immunology and MCB were trained to operate the ultramicrotome.

SUPERVISION OF MCB THIRD YEAR PROJECT WORK

Two MCB third year students, Clare Price and Jason van Rooyen, were supervised for three months on a project entitled “Immunofluorescent localisation of actin in *Drosera capensis*”. Such projects although certainly enjoyed by the students impinge significantly on the time of Unit staff and the future participation of the Unit in this programme will depentd on a variey of factors.

SCHOOL VISITS

Three A level learners from Wynberg High School visited on 2nd February 2001. Bishops grade 10 science students visited on 30th March.

LECTURES

The director delivered the Structural Biology component of the coursework Masters in Molecular Biology and lectured to the third year Botany students. The botany students also attended demonstrations in the 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 2001:

Studies on otoliths
M.E. Waldron
Work on using banding in otoliths from mackerel *(Trachurus trachurus)* to determine the age of the fish was published. Supervision of Ms Margit Wihelm continued as she works on her MSc on anchovy otoliths. Mr Elliott Weni registered for an Msc studying sardine otoliths

Studies of GroEL mutants

B.T. Sewell

Further progress was made with the structure of GroEL mutants in collaboration with Professor Helen Saibil at Birkbeck College in London. The effect of temperature on the structure of the E461K mutant was studied.

Structure of the nitrilase from Bacillus pumilus
M.N Berman, P.R. Meyers, B.T. Sewell
The cyanide degrading enzymes are of potential industrial significance. We have solved three 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.

PUBLICATIONS

Publications, for 2001, that resulted from research in which the EM Unit staff have been directly involved are listed:-

Nelwamondo, A., Jaffer, M.A., Dakora, F.D. 2001. Subcellular organization of N2-fixing nodules of cowpea (*Vigna unguiculata*) supplied with silicon. Protoplasma **216**:94-100

Waldron, M.E. 2001, Age validation in horse mackerel (*Trachurus trachurus*) otoliths.ICES Journal of Marine Science, 2001, **58** (4): 806-813.

Published Conference Proceedings

Cooper, M.I., Sewell, B.T. and Jaffer, M.A. Failure of a simple model to account for the iridescent colours of woodhoopoes. Proceedings of the Microscopy Society of Southern Africa 31:82

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.

Basson J.A, Machio C.N and Knutsen R.D. 2001. The influence of austenite potential on the annealing behaviour of AISI430 ferritic stainless steel. Proc. Recrystallisation & Grain Growth, Aachen, Germany, 27-31, **2,**1161-1166

Durrbaum, D., Rodgers, A.L. and Sturrock, E.D. 2001. A study of crystal matrix extract and urinary prothrombin fragment 1 from a stone-prone and stone-free population. Urology Research **29**, 83-88.

Egan, T.J., Mavuso, W.W., Ncokazi, K.K. 2001. The mechanism of β-heamatin in acetate solution. Parallels between heozoin formation and biomineralization processes. Biochemistry **40**:204-213

Farrant, J.M. and Kruger. L.A. 2001. Effects of long-term drying on the resurrection plant *Myrothamnus flabellifolius*. Plant Growth Regulation. Plant Growth Regulation, **35**: 109-120

Guillard, D. and Lewis, A.E., 2001. Nickel Carbonate precipitation in a fluidised bed reactor: Industrial and Engineering Chemistry Research. **40**:5564-5569

Lewis, A.E., and Roberts, M., 2001. Quantifying morphology of nickel crystals, Journal of the South African Institute of Mining and Metallurgy, **101**:421-428

Linder, H.P. 2001. The Restionaceae. An interactive identification system to the African Restionaceae, on CD. Contributions from the Bolus Herbarium 20

Morgan, B E, Loewenthal, R.E. and Lahav, O., 2001. Fundamental study of a one-step ambient temperature ferrite process for treatment of acid mine drainage waters. Water SA **27**:2 277-282

Ndima, T., Mundree, S.G., Thomson, J.A and Farrant, J.M. 2001. A lea and dehydrin homologue from the resurrection plant *Xerophyta viscosa* Baker are differentially expressed during dehydration. Plant Growth Regulation **35**:137-145

Vander Willigen, C. Pammenter, N.W., Mundree, S.G. and Farrant, J.M. 2001. Some Physiological comparisons between the resurrection grass, *Eragrostis nindensis*, and the related desiccation- senstive species, *Eragrostis curvula*. Annals of Botany, **88**:537-543.

Whittaker, A., Bochicchio, A., Vazzana, C., Lindsey, G. and Farrant, J.M. 2001. Changes in leaf hexokinase activity and metabolite levels in response to drying in the desiccation-tolerant species *Sporobolus stapfianus* and *Xerophyta viscosa.* Journal of Experimental Botany. **352**:961-969.

M.Sc Theses

Beautement, Craig, Chemical Engineering: Investigation of the leaching and oxidation of a secondary lead refiner's slag .

Guilland, Damien, Chemical Engineering: Nickel hydroxy-carbonate precipitation in a pellet reactor

Jeevaratnam, Elizabeth, Chemical Engineering: An investigation into the ferric leaching of Chalcopyrite : a sub-process in the bioleaching of Chalcopyrite

Matthews, Ryan, Materials Engineering: Investigating the influence of thermomechanical variables on ridging in A1S1 430 stainless steel

Pillay, Kriveshini, Chemical Engineering: A Kinetic and mechanistic study on the oxidation of chromium oxide in pure chemicals and in ferrometallurgical slags.

Sheen, Martin, Materials Engineering: Static recrystallization behaviour of AISI 304 stainless steel during hot rolling intervals.

PhD Theses

Brack, Bryan, Chemical Engineering: Replacement of homogeneous acids in the conversion of meta-phenylenediamine to resorcinol by Heterogeneous Analogues.

Martin, Darren, MCB :Maize Streak virus: diversity and virulence.

Mavuso, Winele, Chemistry: Synthetic haemozoin : characterisation, mechanism of formation from haematin and the effect of antimalarial drugs.

Vander Willigen, Clare, Botany: Comparisons of the resurrection grass, *Eragrostis nindensis*, with the related desiccation-sensitive species, *E. curvula.*

Vicre, Maite, Botany: Cell wall involvement in desiccation tolerance in the resurrection plant *Crateros-tigma wilmsii.*

FINANCE

Details of the Unit's accounts are presented in Tables 2, 3, 4, 5 and 6.

OTHER MATTERS

STUDY AND CONTACT LEAVE

Professor Sewell took contact leave from 15 June 2001 to 7 July 2001 in order to attend the Gordon Research Conference on three-dimensional microscopy in Bristol, Rhode Island, visit the new EM Labs at NIH in Washington and make personal contact with Professor Michael Benedik in Houston. He also went to Johannesburg to attend a workshop on electron spectroscopic imaging from 30 Nov - 4 Dec 2001.

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 2001 were BEC, Patterson and Cooke, ENVIG, Henkel Technologies, JMI Industries, National Accelerator Centre, National Botanical Institute, National Razors, Melrose, SA Nylon Spinners, Omnipless, Sasol Mining Initiations, S.A. Museum, Marine and Coastal Management and Warner Lambert.

MICROSCOPY SOCIETY OF SOUTHERN AFRICA CONFERENCE 2001

The 40th Annual Meeting of the MSSA was held at the University of Witwatersrand from 5-7 December 2001. Prof Sewell attended.

VISITORS TO THE UNIT

Dr Chantal de Chastellier from the University of Marseilles spent time working in the Unit as a result of her continued collaboration with Dr Lutz Thilo.

SUMMARY

2001 was a year in which the EMU attempted, in the interests of sustainability, to re-define its role and agressively move towards being an active research partner rather than a passive service provider. This was not achieved and the proposal to put the infrastructure to achieve this in place in 2002 was not accepted by the users of the Unit. The creation of a Masters programme in Structural Biology will certainly produce change and will alter the focus towards self-initiated research which will lead to clashing views of the role of the Unit.

A major achievement of the year was the installation of the JEOL 1200EXII cryo-electron microscope and surrounding infrastructure. This positions us, uniquely in Africa, to contribute to the field of Structural Biology. In addition, the acquisition of freeze substitution apparatus represents a significant advance for UCT's cell biologists.

Prepared by: Associate Professor B.T. Sewell
Director
3 July 2002

TABLE 1

Services Offered by the Unit during 2002

Service	Comment
Access to 200CX TEM	Used by 35 people
Access to 1200EXII TEM	Used by 12 people
Access to S440 SEM	Used by 100 people
Access to S200 SEM	Used by 15 people
Access to the EM109 TEM	Used by 19 people
Acess to the 1200EX	Used by 12 people
Training on 200CX	2 users were trained
Training on S440 SEM	8 new users were trained
Training on S200	2 new users were trained
Training on the EM109 TEM	Used in courses. 4 users individually trained
Access to Ultracut S Ultramicrotome	Used by 34 people
Training on Ultracut S	11 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	Well 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
Printing of EM films	Service used
Preparation of slides of electron micrographs for lecture purposes	Used
Access to optical microscopy facilities	Used
Access to Image Analysis (GENIAS)	Used.
Access to Image Processing and Analysis (Visilog)	Used
Element analysis by EDS	Well used.
"Introduction to EM for Biologists"	This course was held twice.
Access to specimen polisher	Well 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	Not used
Production of CD ROMS	Over 100 were produced
Digitization of transparent media on LS4500	Well used
Production of slides from digital images	Not used
Digitization of video tape	Used
Production of digital videos	Used
Dye sublimation printer	Used
High quality ink-jet printer	Well used
Flat bed scanner	Used

TABLE 2

Equipment Expenditure : Fund 450040

Income	**Amount**
Budgetry Allocation	181,690.00
Carried over from 2000	-5,455.17
Total	**176,234.83**
Equipment Expenditure	
Vacuum Pump	16,354.44
Freeze Substitution equipment	118,999.99
Electrophoresis Kit	14,998.98
Dewars	25,881.42
Total	**176,234.83**

TABLE 3

External Services: Fund 001258

Income	
Opening Balance	129,121.86
Sales revenue	167,908.85
Fund Transfer from Materials Engineering	25,000.00
Total	**322,030.71**
Expenditure	
Operating Expenses	22,073.27
Postage/Fax/phones	1,618.17
Stationery	1,288.86
Repairs & maintenence/utilities	84,806.19
Asset Aquisition	18,970.95
Assets - Computers	52,220.03
Travel	321.05
Computer consumables	12,041.39
Total	**193,339.91**
Closing Balance 2001	**128,690.80**

TABLE 4

Departmental Grant: Fund 000516

Annual Grant	79,027.09
Carried over from 1999 (unpaid bills)	-3,576.19
Total	**75,450.90**

Computer software	6,151.72
Conference expenses	1,438.95
Operating expenses	24,219.55
Periodicals	364.57
Stationery	1,516.38
Equipment	45.60
Postage & Telephones	12,780.41
Cleaning	550.00
Repairs & Maintenance	8,335.97
Utilities	17,267.25
Travel	2,453.00
Asset aquisitions	327.50
Total	**75,450.90**

TABLE 5

Consumables Store: Fund 000933

Income	
Opening Balance	34,304.90
Internal recoveries	56,390.35
Total	**90,695.25**
Expenditure	
Computer Consumables	15,455.00
Consumables	42,249.46
Stationery	2,575.64
Utilities	825.85
Assets	670.00
Total	**61,775.95**
Closing Balance 2001	**28,919.30**

TABLE 6
Maintenance: Fund 000995

Income	
Opening Balance	18,394.11
Internal Recoveries	44,391.84
Total	**62,785.95**
Expenditure	
Computer Software	2,614.84
Operating Expenses	7,688.33
Postage	1,306.10
Staffing	1,822.50
Cleaning	96.50
Travel	636.88
Conference expenses	769.00
Repairs & Maintenance	18,521.78
Utilities	1,954.56
Assets - computers	18,739.93
Total	**54,150.42**
Closing Balance 2001	8,635.53

TABLE 7

Users of the Unit

* indicates Microscope users

Anatomical Pathology		
	Egan, Joann	Hons*
	Kirsch, Richard	Staff*
Archaeology	Lee Thorpe, Julia	Staff
	Jacobs, Dana	MSc*
	Miller, Duncan	Staff*
Botany	Aguilar, Gonzalo	Staff
	Anderson, Bruce	PhD*
	Anderson, Rob	Staff*
	Bereton-Styles, R	MSc
	Chuba, David	MSc*
	De Ronse Crane, Louis	Staff*
	De Villiers, Sue	Staff*
	Iyer, Revel	PhD*
	Kloncin Enrico	MSc
	Klak, Cornelia	MSc*
	Linder, Peter,	Staff*
	Lukheii, Shumani	MSc*
	Spriggs, Amy	PhD*
	Newton, Rose	Staff*
BEC	Lehman, Marcus	Staff*****
	Marsden, Arthur	Staff*
Cape Technikon,		
Dept Chem Eng	Soloman, Marshal	Staff*
Cape Heart Centre	Davies, Neil	Staff*****
	Samodien, Nazlia	Staff*
Chemistry	Allie, Shameez	MSc*
	Durrbaum, Dawn	PhD*
	Egan, Tim	Staff*
	Mavuso, Winile	PhD*****
	McHarg, Tracey	Hons*
	Nassimbeni, Luigi	Staff*
	Ncokasi, Kanyile	MSc*
	Rogers, Alan	Staff*****
Chemical Engineering	Arjunwadker, S	Staff*
	Biquiza, L.	MSc
	Hassen, P.	Hons*
	Jaffer, Ashraf	MSc*
	Jeenaralnam, Elizabeth	MSc*
	Kammurtsi, Kenneth	Hons*
	Balasundaram	MSc*
	Chirinos, Ada	PhD*
	Claeys, Michael	Staff*
	Lewis, Alison	Staff*
	Mabaso, Itai	PhD*
	Moon, Gillian	PhD*
	Moon, JoAnn	PhD*
	Peterson, Karen	MSc*
	Pillay, Kriveshini	MSc*

	Roberts, Mandy	MSc*
	Roberts, Stephen	MSc
	Sewoo, Shilpa	Hons*
	Tshwalu, M	Msc*
	Vasic, Suzana	Staff*
CHED	Mvandaba, Nomzalo	Hons
	Ndongeli,Frans	Staff
Civil Engineering	Jaufeerally, Hassen	MSc*
	Morgan, Barak	MSc*
	Scott, Alan	MSc*
ENGEO	Grey, Catherine	PhD*
ENVIG	Van Noordwyk, M	Staff*
Geological Sciences	Bailie, Russel	PhD*
	Compton, John	Staff*
	Giuliana, Franceshini	PhD *
	McKenna, Neil	MSc*
	Minter, Laurie	Staff*
	Ngu, Muy	MSc*
	Simpson, Keryn	Hons*
	Smith, Meris	MSc*
	Ulansky, Chad	MSc*
	Westerlund, Kalle	PhD*
	Whitehead, Kerryn	MSc*
	Wrigley, Rochelle	PhD*
Henkel technologies	Massyn, Werner	Staff*
Human and Cell Biology	Kidson, Sue	Staff*
	Mgweba, Thandi	PhD*
	Richardson, Bronwen,	Hons*
	Thompson	Hons*
	Van der Merwe, Liz	Staff*
JMI Industries	Deane, Jimmy	Staff*
Liver Research Centre	Burch, Vanessa	PhD*
Materials Engineering	Basson, Janet	Staff*
	Chickemwaba, Sam	PhD*
	Fewell, Sean	Msc*
	Graham, Ryan	Hons
	Hapazari Innocent	MSc
	Klaas, Nkosana	MSc
	Knutsen, Rob	Staff*
	Lang, Candy	Staff*
	Matthews, Ryan	PhD*
	Nzula, Miemie	PhD*
	Ndlovu, Phili	MSc*
	Ochola, Robert	PhD*
	Patil, Ravindra	MSc*
	Pike, Craig	MSc*
	Rajab, Sibthayan	Hons*
	Sello, Maitse	MSc*
	Sheen, Martin	MSc*
	Shale, Teboho	MSc*
	Topic, Mira.	PhD*
	Tsale, PV	BSc*
	Rayab, S	Hons*
	Zimba, Joe	PhD*

MCM	Botha, Lizeth	PhD*
Mechanical Engineering	Naidu, Thevashen	MSc*****
Medical Biochemistry	De Chasteller, Chantelle	Staff*****
	Sturrock, Ed	Staff
Medical Microbiology	Johnston, N	MSc
	Schwegmann, Anita	PhD*
	Tiedt, Fritz	Staff*****
Melrose	Schoevers, Anine	Staff*****
Molecular and Cell Biology	Ah Tow, Lemese	PhD
	Berman, Mark	MSc*
	Cooper, Keren	MSc*
	Denby, Katherine	Staff*
	Doeschate, Kim	PhD*
	Farrant, Jill	Staff
	Gardner, Michael	MSc*
	Illing, Nikki	Staff
	Jaffray, Anne	Staff*
	Lindsay, Goerge	Staff*
	Price, Claire	BSc*
	Motshweni, Precious	MSc*
	Martin, Darren	PhD*
	Marais, Saberi	Hons*
	Meyers, Paul	Staff*
	Mundree, Sagadevan	Staff*
	Ngqakayi, Thozama	MSc*
	Rybiki, Ed.	Staff*
	Vander Willigen, Clare	PhD*
	Van Rooyen, Jason	Bsc*
	Van Wyk, Jennifer	Hons
Multimedia	Walton, Marion	Staff
NAC	Pryzbilowycz, Yola	Staff*
	Pryzbilowycz, W.	Staff*
	Ogoma, Christopher	MSc*
	Ramoutar, Rakeshnie	MSc*
	Turner,Gabriella	MSc*
National Razors	Filmore, Anthony	Staff*
NBI	Kurzweil, Hubert	Staff*****
Namakwa Sands	Philander, Carlos	Staff*
Oceanography	Bernard, Stuart	PhD
	Waldron, Howard	Staff
Omnipless	Griffiths, Brendon	Staff*
Patterson and Cooke	Van Sittert, Fritz	Staff*****
Pharmacolgy	Walden, Jason	MSc*
Physics	Comrie, Craig	Staff
	Hempel, Maren	Staff*****
Rhodes University		
Southern Ocean Group		
	Vumazonke, Lukhay	MSc*****
Sasol Mining Initiations		
	Glen, Oliver	Staff*
S.A. Museum	Reeb, Desray	PhD*****
SANS Fibers	Eunice, G.	Staff*****
University of Kampala	D'ujanga, Florence	PhD*****

University of Stellenbosch		
Chemical Engineering		
	Barrie, Stean	MSc*
	De Wet, Ockert	BEng*
	Ecksteen, Jaques	Staff*
	Van de Ven, Nelke	MSc*
	Van Dyk Lizelle	PhD*
	Wessels, Wynand	MSc*
Dentistry	Chickte, Usuf	PhD*
	Van Wyk, C	Staff*
Inst. Polymer Science	Higham, Lawrence	PhD*
	Hoogesteger, Bram	MSc*
	Li, Jianxin	PhD*
	Moelan, J.	MSc*
	McLeary, E	MSc*
	Van Zyl, Andre	PhD*
Geology	Henning, Esme	MSc*
	Mottie, Bradley	Hons*
	Stalder, Marcel	PhD*
	Smit, Riana	PhD****
Microbiology	Pluddemann, Annette	PhD*
Oncology	Bohm, Lothar	Staff*
Wine Biothechnology	Du Toit, Corina	MSc*
	Malherbe, Danie	MSc****
UWC		
Microbiology	Johns, Jhill	MSc****
	Huna, Thembela	MSc****
Urban Planning	Todeschini, Fabio	Hons
Virology	Kohl, Thomas	MSc****
	Versani, Arvind	PhD****
Warner Lambert	Twigg, Cheslin	Staff****
WITS	Annegarn, Harold	Staff*
	Cumbane, Julio	MSc****
Zoology	Weni, Elliot	MSc*
	Wilhelm, Margit	MSc*

Users not registered with full names: 4

Total: 180
Total Microscope Users: 160