



RUDOLF MARLOTH

Brochure ~ Brosjure

**Southern African Association for the Advancement
of Science**

**Suider-Afrikaanse Genootskap vir die Bevordering
van die Wetenskap**

ANNUAL MEDAL AWARD CEREMONY

2 November 1998

JAARLIKSE MEDALJE TOEKENNING

SUID-AFRIKA MEDALJE (GOUD) 1998 : ONTVANGER: PROF JH VAN DER MERWE

Prof Johannes Hendrik van der Merwe kan terugkyk op 'n skitterende loopbaan as Fisikus. Sy spesialiteitsgebied is die Vastetoestand Fisika met spesialisering in Oppervlaktestruktuur, Dun Films en Epitaksie. Sy navorsing en die ontwikkeling van 'n teorie het baie bygedra tot die ontwikkeling van moderne toestelle soos byvoorbeeld die vlokke.

Hy het in 1946 as dosent in Toegepaste Wiskunde aan die Universiteit van Stellenbosch begin en was daarna vir ses jaar navorsers by die WNNR. Vanaf 1953 tot 1989 was hy dosent en later Professor in Toegepaste Wiskunde en Fisika aan die Universiteite van Pretoria, Port Elizabeth en Unisa. Vanaf 1973 tot 1975 was hy ook Direkteur van die Instituut vir Mikrostrukture aan die Universiteit van Pretoria. In 1990 word hy aangestel as Professor Extraordnarius aan die Universiteit van Suid-Afrika en in 1992 is hy besoekende wetenskaplike by die Kodak Navorsingslaboratorium in Rochester in die VSA. In 1961, 1970 en 1981 is hy besoekende Professor aan die Universiteit van Virginia en in 1981 en 1989 besoekende Professor aan die Tegniese Universiteit Clausthal. Talle studente het onder sy leiding gepromoveer.

Prof van der Merwe was en is ook aktief betrokke in wetenskaplike komitees soos byvoorbeeld komitees van die WNNR oor navorsingstoekennings en uitruilskemas en die keurkomitee vir die Havengaprys en die Goue Medalje van die SA Akademie vir Wetenskap en Kuns. Hy was ook betrokke in komitees van die WNNR, die SA Instituut vir Fisika en internasionale kongresse oor dunfilms. Hy was ook op die Redaksierade van die tydskrifte "Thin Solid Films" en "Interface Science." en beoordeel ook artikels vir verskeie Fisika tydskrifte. Hy het self ongeveer 120 publikasies die lig laat sien en is 30 keer gevra om as genooide spreker by nasionale en internasionale konferensies op tree. Hy is ook uitgenooi om nominasies in te dien vir die Nobelprys en die Japanprys.

Hy was of is ook lid van verskeie wetenskaplike organisasies soos die SA Instituut vir Fisika, die SA

Akademie vir Wetenskap en Kuns, die Britse Instituut vir Fisika, die Material Research Society in die VSA, die Royal Society of South Africa en die American Association for Advancement of Science.

Prof van der Merwe het ook erkenning vir sy baanbrekerswerk ontvang soos blyk uit die volgende toekennings:

Klas A navorser deur die Stigting vir Navorsing-ontwikkeling in 1984; Havenga prys vir Fisika in 1967; E W Mullerprys van die Universiteit van Wisconsin-Milwaukee in 1983; De Beers Goue Medalje vir Fisika in 1984; D.Sc (honoris causa), Universiteit van Suid-Afrika, 1985; Claude Harris Leon Stigting Prys in 1986; SAMES prys vir die beste publikasie in die SA Joernaal vir Fisika in 1987; Die Orde vir Voortreflike Diens Klas 1: Goud in 1989; D.Sc (honoris causa), Universiteit van Pretoria, in 1990; D.Sc (honoris causa), Universiteit van Port Elizabeth in 1994.

Op ses en sewentigjarige ouderdom is Prof. Jan, soos hy algemeen bekend is, steeds aktief by Unisa besig met navorsing in sy geliefde vakgebied. Hy is ook bekend vir sy vriendelikheid en beskeidenheid. Dit was dan ook vir S₂A₃ 'n voorreg om die Suid-Afrika Medalje (Goud) vir 1998 toe te ken aan 'n wetenskaplike van die formaat van Prof van der Merwe.

Ten tye van die toekenning van die Medalje het Prof van der Merwe pas 'n oogoperasie ondergaan. Ons wens hom spoedige herstel toe en nog jare van vrugbare navorsing.



A BRIEF SUMMARY OF THE RUDOLPH MARLOTH LECTURE

EPITAXY

by Jan H van der Merwe

Geagte Meneer die President, ek wil graag u en die Raad van die S₂A₃ bedank dat u my werk waardig geag het vir die toekenning van die Suid-Afrikaanse Medalje (Goud). Ek bely my algehele afhanklikheid van my Skepper vir die prestasies aan my toegedig. Hy het my geseën met: gawes, ouers met visie, 'n wonderlike eggenote, voortreflike leermeesters - veral prof. J M le Roux vir wiskundige agtergrond, prof. Sir Neville Mott vir die PhD.-navorsingstema en prof. Sir Charles Frank vir die samewerking en identifikasie van EPITAKSIE as 'n belangrike toepassingsgebied - besondere geleentheid en begaafde medewerkers.

In my address, Mr President, I wish to introduce you to the phenomenon of epitaxy - my main research field - and to highlight my personal contribution towards understanding and harnessing its potentialities in fundamental physics but more so in Technology: computers, automation, communication, space exploration, lasers, diagnostic devices in medicine, the TV, miniaturization and many, many more.

Epitaxy is the phenomenon in which a crystal *B*, normally in thin film form (the epilayer), grows in a unique orientation (tilt and azimuthal) on a specific surface of crystal *A* (the substrate), usually different from *B*. The phenomenon was first identified by Frankenheim in 1836 and first studied theoretically by van der Merwe (1949) in collaboration with FC Frank. The devices, constituting the above-mentioned technologies, are mostly fabricated through the growth of thin films required to display a high standard of perfection in crystallinity, thickness uniformity and composition distribution - deviations from perfection are detrimental to the operation and stability of the devices. Epitaxy serves best to acquire the necessary standard of perfection. Its potential in device fabrication was realized in the sixties.

Van der Merwe, in collaboration with FC Frank, has analysed the stability (equilibrium structures) of epilayers under quasi-equilibrium conditions of growth. The analysis was subsequently extended and refined by various workers, including myself. The Frank van der Merwe theory, as based on a simple model - the Frenkel-Kontorowa model (1938) - displayed almost all the important factors though. The theory predicts that a monolayer (ML) that grows by addition of consecutive atoms at an advancing ML edge will be stable below a critical interfacial misfit f_c - whose magnitude depends on the relative strength of *A* - *B* and *B* - *B* forces - in a pseudomorphic configuration, i.e. homogeneously strained in registry with the substrate. If the substrate is perfectly crystalline, the epitaxial ML and a multi layer that grows pseudomorphic in a ML-by-ML (so-called Frank van der Merwe) mode will be perfectly crystalline too, as well as oriented (epitaxial). Furthermore, it will also satisfy the uniformity requirement. However, such a pseudomorphic multilayer will become unstable at a critical thickness due to excessive strain energy and strain is relieved by the introduction of so-called misfit dislocations (MDs) - detrimental defects with the potential to multiply. The predictions of the theory have been verified by ingenious techniques developed by experimentalists.

To grow below f_c and h_c would thus be the ideal objective, if it were not for the fact that in most *A* - *B* combinations the growth commences, or changes after deposition of a few MLs, to nucleating separated islands that ultimately culminate into a film of non-uniform thickness. Bauer (1958) has proposed useful equilibrium criteria to predict growth modes, criteria that were subsequently generalized by myself and others.

It need be mentioned that non-equilibrium procedures have been identified to extend pseudomorphic growth into the metastable regime, particularly in semi-conductors, the most common device material the barrier against the introduction of MDS being too high to be overcome by the thermal energy at the operating temperature. ML-by-ML growth has likewise been extended into forbidden regimes by ingenious inventions to which I could contribute somewhat to their understanding.

The fact that stable homogeneously strained epilayers could be grown has led to the fabrication of artificially structured materials that have useful properties different from the basic materials. An important example is the tailoring of electronic properties, known as band-gap engineering, in device fabrication. It likewise contributed to miniaturization in one dimension - thin stable epilayers comprising one or a few atomic layers can be fabricated.

The MESSAGE is clear - RESEARCH is vital for the development of technologies needed to sustain and upgrade modern lifestyle.

BRITISH ASSOCIATION MEDAL: SILVER: RECIPIENT 1998 - PROF OCKER C DE JAGER

Prof Ocker C de Jager is a full Professor in the Department of Physics at the Potchefstroom University from 1996. Since 1984 he was Research Scientist, Senior Research Scientist, Chief Research Scientist and Associated Professor at Potchefstroom University. From January 1991 to December 1991 he was National Research Council Research Associate at the NASA/Goddard Space Flight Center in the USA.

He obtained his B.Sc. (Physics) in 1981, M.Sc. (Physics) in 1983 and Ph.D. (Physics) in 1987, all at Potchefstroom University.

He is involved in the experimental and theoretical aspects of gamma-ray emission from galactic and extragalactic sources. This also involves an evaluation of radio, optical and X-ray information from such objects to identify non-thermal activity. The transparency of the Universe to gamma-rays is also actively studied. He is further involved in the observations, analyses and interpretation of TeV gamma-rays from point sources in the ongoing very high energy gamma ray experiment of the Potchefstroom Group in South Africa.

Prof de Jager is a member of the International Astronomical Union and the South African Institute of Physics. He received the following awards:

British Association Medal (Silver) from S_2A_3 in 1998
Shakti Duggal Award from IUPAP Commission on Cosmic Rays in 1995
Presidential Award from the Foundation for Research Development in 1989 and 1996
Silver Jubileum Medal from the South African Institute of Physics in 1989

Prof de Jager has received 8 invitations to present papers at international conferences. He has presented 26 papers at international conferences and 9 papers at local conferences. He is the sole author of 5 publications in international journals and co-author of 45 publications in international journals. He is also the sole author of 7 publications in International Conference Proceedings and co-author of 46 publications in International Conference Proceedings.



MERIT CERTIFICATE : PROF J D BRADLEY

Prof John Bradley received a merit certificate from S_2A_3 for developing a unique chemistry set which does the work of a well-equipped school science laboratory. He is currently Director of the University of the Witwatersrand Centre for Research and Development in Mathematics, Science and Technology Education, known as RADMASTE,

Most countries have serious problem doing science experiments in school classrooms because of cost and safety. However, the South African kits solve these problems because they are much smaller, safer and cheaper than what is normally used in a school laboratory. The primary kit costs R30 whereas the advanced kit costs R60. Compare this with the R150 000 - R200 000 which is the approximate cost of providing a traditional school laboratory.

Most children have never seen science experiments actually being carried out. Now these kits are transforming the children's experience of science. The response from both children and the teachers who have started using these kits has been extremely positive.

This micro-chemistry set has attracted much international attention. As a result, RADMASTE, which is an associate of the United Nations Educational, Scientific and Cultural Organization (UNESCO), could be instrumental in promoting what could be another major development in science education by changing the way science is taught worldwide. The kit makes it possible for science to be taught in remote, underprivileged areas with limited facilities.

It is for this unique service to the advancement of science education, both in South Africa and on an international level, that the Council of S_2A_3 has decided to award the S_2A_3 Merit Certificate to Professor John Bradley.



Prof. J Bradley (L) with his chemistry set. Dr. Ian Raper (Pres. of S_2A_3) on the right.

CRITERIA FOR MEDAL AWARDS

SOUTH AFRICA MEDAL (GOLD)

The South Africa Medal (Gold) is awarded to a person who, during his or her life, has contributed to the advancement of science, either on a broad front or in a specialised field of the natural sciences and those human sciences which traditionally participated in the activities of the Southern African Association for the Advancement of Science. The medal shall be a gold medal and shall enjoy the status of one of the highest awards to a scientist in Southern Africa.

BRITISH ASSOCIATION MEDAL (SILVER)

The British Association Medal (Silver) is awarded to a person under the age of 40 years who is actively engaged in scientific research and who has proved evidence by way of publications, discoveries and/or skills of outstanding capability and achievement, especially when measured by international standards. The medal shall be struck in sterling silver and must enjoy the status of one of the highest awards for original scientific research in Southern Africa.

MERIT CERTIFICATE: GERHARD VON GRUENEWALDT

Gerhard von Gruenewaldt was born in Germany on 10 August 1942 and immigrated to South Africa with his parents in 1952. After matriculating in 1959 he studied Geology at the University of Pretoria where he obtained a D.Sc. degree in 1972. He spent 1973 at the University of Munich on an Alexander von Humboldt research fellowship. He joined the University of Pretoria as a lecturer in 1965, advancing to senior lecturer, and in 1974 he was appointed professor and director of the Institute for Geological Research on the Bushveld Complex. In 1978 he was also appointed head of the Department of Geology and in 1989 as first chairman of the School of Mining and Mineral Science of that university.



He is the author and co-author of more than 50 research papers, many of which were read at international conferences. Twenty three masters and seven doctoral students completed their studies under his supervision. For his research he received comprehensive support grants from the Foundation for Research Development (FAD), including the directorship of an FAD Research Unit. He served on various national and international scientific committees, inter alia as chairman of the Advisory Educational Committee of the South African Council for Natural Scientists, regional vice-president of the Society for Geology Applied to Ore Deposits, and secretary of the Commission

GERHARD VON GRUENEWALDT

on Ore Deposits in Mafic and Ultramafic Rocks of the International Association for the Genesis of Ore Deposits.

His scientific achievement is based on the contribution made in respect of research on the genesis of rocks in the unique Bushveld Complex and associated ore deposits. His contribution particularly in the field of platinum mineralisation led to valuable new insights regarding the nature of occurrence and genesis of these important ores which, besides earning him international recognition as a scientist (a.o. an A-rating by the FAD in 1989), have great significance for the South African mining industry. In recognition of his contribution to geological science, he received the Award for Excellent Achievements of the University of Pretoria in 1989 and the Draper Memorial Award of the Geological Society of South Africa in 1990.

He joined the Foundation for Research Development as Vice-President responsible for programmes and planning in 1992. In this capacity he was instrumental in realigning the research support for higher education with changing realities and needs of the new South Africa. Since the beginning of August 1996 he has been given the broadened responsibility as Vice-President and Chief Operations Officer of the FRD.

He is also recognized by S₂A₃ for a Merit Award for his valuable role over a number of years in the selection of the winners of the Gold and Silver Medal Awards.

NASIONALE RAAD VAN S₂A₃: 1998/1999

President:	Dr Ian Raper
Vise-Présidente:	
Gauteng:	Dr F Korb
Oos-Kaap	Prof W Oelofsen
Kwazulu-Natal:	Prof R A Preston-Whyte
Vrystaat en Noord-Kaap:	Vakant
Wes-Kaap:	Mnr J S Jones
Ander streke	
Ere-Tesourier:	Mnr H Ortner
Ere-Sekretaris:	Mev S Korsman
Jeugvertegenwoordiger:	Me E Ortner
Nuusbrief en Skakelwerk:	Mrs E den Dulk
	Dr P Minnaar
Reklame	Dr F Kok
Addisionele lede:	Dr G Jones
	Mnr E Hanau
	Prof M Wingfield
Oud-Présidente:	Prof G van Drimmelen
	(Ere-lid)
	Prof J P F Sell-schop
	Prof P Smit
	Prof J Wolfaardt
Voorsitter, Pretoria-tak:	Dr P Minnaar

SPECIAL AWARD TO DR GRAHAM BAKER

(Presented by Dr Gerhard von Gruenewaldt)

“Allow me first of all to thank the Council of the South African Association for the Advancement of Science for agreeing to incorporate this very special award as part of your annual awards ceremony - even though I believe that the S₂A₃ has a moral obligation to do so, as it is this Association which gave birth to the SA Journal of Science in 1903, i.e. 75 years ago.

It is a very great honour and a pleasure for me (in my capacity as Acting President of the FRD), to present, together with Dr Raper, a special certificate and award to Dr Graham Baker on behalf of the community of scientists. With this certificate and a small present that goes with it, we wish to pay tribute to a very extraordinarily dedicated and committed person. A person who has unselfishly given virtually his entire career so far to the advancement of science in this country.

We commemorate today his 25 years as Editor of the SA Journal of Science. This may at first glance not seem to be a very extraordinary achievement; the Journal appeared regularly on the shelves for 25 years, but anyone who has had some insight into the turbulent history of this journal over the past 25 years, will agree with me that we are dealing here with a person of tenacity and perseverance.

Graham Baker, a physicist with a D.Phil from Oxford, came to South Africa in 1973 at the request of the then editor of Nature, John Maddox for a six-month period to try and resurrect the SA Journal of Science which at the time, had virtually ceased publication. These six months became 25 years! At the time when Graham came, the Journal was still with S₂A₃.

- S₂A₃ - McMillan for 2 years, could not make profit.
- Passed back to South Africa. CSIR provided some support.
- S₂A₃ provided caretaker home for a while.
- Joint Council of Scientific Societies for two years.
- Became part of AS&TS - home in Kelvin House.
- Support for Journal from a state subsidy through the Bureau for Scientific Publications.
- Future of AS&TS became uncertain at end of eighties with the move from Kelvin House to Observatory in Johannesburg - Journal came to FRD in 1990.
- 1994 - Department of Education consolidated the home of the journals that qualified for a subsidy under Bureau for Scientific Publications - move to FEST.
- Did not work out. DACST requested FRD to take on management control of Journal until such time as the future of state funded journals had been resolved.



The Journal literally was padded from pillar to post, from one organisation to the next in an effort to find an ideal home. Graham has stuck with the Journal - in many instances not knowing from day to day whether he has a Journal and a job or not. He is a man who placed a cause, something he passionately believes in, before personal comfort and job security. It is as a result of this passion that the Journal has survived over the years and for which we are deeply indebted to him.

The question can rightfully be asked: what does the future hold? Has the future of the Journal been secured? The Department of Arts, Culture, Science and Technology has recently commissioned a study on the future of state subsidised research journals. Although the findings of this investigation have not yet been made public and we do not have a response by the Department on the report - we are given to understand that the report has singled out three South African journals whose international impact is above the median when compared to their counterparts internationally - the SA Journal of Science is one of these three. If Government commits itself in future to direct its support to those South African scientific journals with the highest quality and impact, as I believe the report recommends, then the SA Journal of Science surely has to be among them. This must be a comforting thought to Graham, not only in terms of the longer term security of the Journal, but also that it is to a very large extent his own doing that the Journal has performed so well over the years.

But there are other initiatives on the way to secure the longer-term future of the Journal. I do not wish to go into any details, suffice it to say that the way is being paved for Graham to serve another 25 years as Editor of the SA Journal of Science, and hopefully a less turbulent 25 years!

In addition, I am given to understand that one of the highlights in Graham's career as Editor of the Journal was last year's special edition in commemoration of the discovery of Ms Ples at Sterkfontein 50 years ago. The South African Mint also commemorated this event by striking a limited edition of R2 gold coins. As part of our appreciation, and here I also wish to acknowledge a sizeable contribution by the Transvaal Museum, we would also like to present to you one of these gold coins.”

PRESIDENT'S REPORT 1998

The current membership of the Association stands at 102, of whom 13 are life members and 1 is an honorary member. We are confident of attracting increasing numbers of participants in the next few years especially from the ranks of younger academics, students and young non-scientists. It is particularly important that previously disadvantaged universities and schools are properly represented. At the level of teacher training, crucial foundations must be laid, and university faculties and colleges of education call for special attention.

Recent discoveries in fields such as archaeology and paleontology in South Africa, as well as renewed astronomical, genetic and other events world-wide have augmented public interest in science and technology. Documentary series and reporting in the media have often been of an unprecedented standard. Science fiction is enormously popular among all age groups, dominating even children's television programmes and video games.

Lectures presented by the Pretoria Branch have deservedly attracted large audiences thanks to very competent publicity, the topicality of the subjects and the eminence of lecturers. Our awards, which now include medals for technikon achievers, play their part in establishing S₂A₃ as an important agent in the propagation of science. Fourteen universities and two technikons awarded bronze medals to their best masters students in 1998. It will be of great interest to follow the progress of outcomes-based learning with the implementation of the new curriculum. Our country and our continent are in a phase of reconstruction which demands skills and open-minded discovery learning at all levels, formal and non-formal.

Scientific research has a great responsibility in ensuring and enhancing people's quality of life and contributing to prosperity and informedness. The TRC hearings have revealed that some scientists have at times collaborated in iniquitous projects, producing horrendous instruments and materials of destruction and conniving at the suppression of evidence. S₂A₃ continues to be dedicated to environmentally responsible and humane scientific developments, so that our science and our technology can indeed form a proud part of our total national heritage.

The Department of Arts, Culture, Science and Technology has dedicated this year to a nation-wide focus on science and technology, producing numerous festivals, exhibitions and publications. Activities such as Expo for Young Scientists have continued their successful and exciting work. Out thanks and congratulations are offered to all who were involved, and who are increasingly interacting with international scientific endeavours.

S₂A₃ is particularly fortunate, as reflected in the attendance at our award ceremonies, in retaining the interest and participation of members and achievers of long standing. We are grateful and overjoyed to meet with them.

This, the original scientific society in southern Africa, remains a unique family with remarkable tenacity and optimism, and its office-bearers are consistently impressive in their dedication. It would be extremely remiss when paying tribute to our award winners at the ceremony to neglect during the AGM also to address thanks to our national secretary, Mrs Shirley Korsman and to Mrs Esmé den Dulk, Professor Govert van Drimmelen, Mr Eugen Hanau, Dr Frans Korb and Dr Glyn Jones. To Dr Phil Minnaar, Ms Erla Ortner and others in the Pretoria Branch, we extend our thanks for the very active roles they have played. Surely, any country can have few events as happy as our annual recognition of excellence in the sciences and technology.

Dr Ian Raper
President

MEMBERS IN THE NEWS

Dr Lesley Codd

Dr Lesley Codd, a life member of S₂A₃ and Gold Medal winner in 1997 recently turned 90.

He was born in Natal and studied at the University of Natal. After working in Trinidad and British Guiana he started working for the National Botanical Gardens in Pretoria and was Director of the Gardens, which was then known as the Botanical Research Institute, from 1962 to 1972.

Dr Codd has written many books. His first was on the trees and shrubs of the Kruger National Park, which was then sold for seven shillings and six pence. Many books followed this one, including a book on Red Hot Pokers, of which he identified no less than 45 species.

Rekord-Centurion (2-10-98)

Dr C K Brain

Dr Bob Brain, well known anthropologist and zoologist and recipient of the 1997 South Africa Medal (Gold), published a biography of Austin Roberts, the author of the Roberts' The Birds of South Africa, during 1998.

Austin Roberts was born in 1883, the son of church minister. He started working at the Transvaal Museum in 1910, until he was employed on a permanent basis a few years later. He went on many expeditions to collect specimens of birds and mammals. He received an honorary doctorate from the University of Pretoria.

Dr Brain included Roberts' journal in the biography and this provides extra insight into the full life of this lover of nature. With this biography Dr Brain has published an Africana book which is in itself a collector's item.

Pretoria News (2-9-98)

ANNUAL REPORT - PRETORIA BRANCH - 1998

The Pretoria Branch of S₂A₃ once again organised an interesting series of lectures by scientists in various fields. The following lectures were presented:

2 March	Dr E H Matthews	Use and abuse of the scientific process - interesting successes and mishaps in science
4 May	Prof A E Duffey	The artist and the fourth dimension
1 June	Prof J Bishop	Using JAVA on the World Wide Web
3 August	Prof R Crewe	Language and manipulation in honeybee social communication
18 September	Dr D Malin	A Universe of colour

A newsletter containing news about events of S₂A₃, as well as interesting items from the world of science, was published on occasion during the year.

A survey was conducted amongst attendees to determine the best day and time for the lectures as well as topics for future lectures. The majority opted for Monday at 17:15 and an interesting variety of possible lectures for the future have been identified.

Dr Freek Kok again arranged excursions to the Planetarium and the Tswaing Crater near Pretoria. These excursions are popular and will be continued in 1999.

The recruitment of new members remains a priority.

The members of the Committee for the 1998/1999 are: Dr Phil Minnaar (Chairman), Erla Ortner (Secretary), Dr Elise Venter (Treasurer), Eugen Hanau, Dr Glyn Jones, Dr Freek Kok, and David van der Walt.

A special word of appreciation is due to members of Council for their support to the Pretoria Branch. The dedication of members of the Committee, as well as the support of the members, is appreciated.

The Pretoria Branch of S₂A₃ will continue to promote science in the interest of South Africa.

Dr Phil Minnaar
Chairman

BRONZE MEDALS FOR TECHNIKONS

The Council of S₂A₃ has decided to annually present each of the 15 technikons in South Africa with a bronze medal to be awarded to the best MTech student at every technikon. The new Award was formally announced at a meeting with the Chairman of the Committee of Technikon Principals, Mr B de L Figaji.

The memorandum of the award scheme reads as follows:

WHEREAS the vision of technikons in South Africa is that technikons will be the leading higher education institutions in providing high-level career and technologically oriented human resources and

WHEREAS the Southern African Association for the Advancement of Science (S₂A₃) is dedicated to encourage the pursuit of science and technology amongst the youth and to commend and to recognise those who excelled in their scientific and technological field,

THEREFORE the Council of S₂A₃ decided to annually donate a bronze medal to each of the technikons in South Africa and that these medals be awarded by each technikon to the student who presented the best dissertation for the MTECH degree in any of the following fields in a particular academic year:

S₂A₃ BRONZE MEDAL AWARDS FOR TECHNIKONS

Technikon Free State

Mr CHL Sander

M.Tech. (Engineering: Electrical)

Title: *"An Earthing Design Guide for Single Wire Earth Return (SWER) Systems in the Northern Cape Region"*

Technikon Pretoria

Mr CJL Adlem

M.Tech. (Chemistry)

Title: *"The treatment of sulphate-rich effluents with the barium sulphide process"*



Dr Phil Minnaar with the first recipient of the S₂A₃ Bronze Medal at a technikon, mr CHL Sander, and senior personnel of the Tehnikon Free State.

Previous winners of the South Africa Medal: Gold
From l.t.r. Prof PN Stoker (1991), Prof PV Tobias (1967), Prof G van Drimmelen (1965), Prof JPF Sellschop (1974), Prof RR Arndt (1992), Prof CK Brain (1997).

S₂A₃-BILLITON BRONZE MEDAL AWARDS: 1998

University of Cape Town

Mr BACC Bassett

M.Sc. (Mathematics) (with distinction)

Title: "*Aspects of Modern Cosmology*"

University of Durban-Westville

Ms R Ramsuruth

M.Sc. Applied Mathematics

Title: "*The Minimum Eigenvalue Problem*"

Medunsa

Ms MW Diale

M.Sc. (Physics)

Title: "*A study of silicide formation using tantalum*"

University of Natal

Durban Campus

Mr JBA Verstraete

M.Sc. Maths (with distinction)

Title: "*Vulnerability and Cycle Structure of Planar Graphs*"

Pietermaritzburg Campus

Mr DB Woods

M.Sc. School of Environment & Development (*cum laude*)

Title: "*Fighting Artificial Water Points in Mkuzi Game Reserve*"

University of the Orange Free State

Mr MPA Coetzee

M.Sc. Microbiology

Title: "*Characterisation of Armillaria in South Africa*"

University of Port Elizabeth

Ms ML Bursley

M.Sc. Zoology (*cum laude*)

Title: "*The Benthic Macrofauna of an Estuarine Flood-tidal Delta*"

Potchefstroom Universiteit vir CHO

Mr LR Koekemoer

M.Eng. (Chemical)

Title: "*The extraction of nickel with the use of supported liquid membrane capsules*"

University of Pretoria

Mr S Kok

M.Eng. (Mechanical)

Title: "*Rapid heating and cooling of pressure vessels through optimal temperature control: a general methodology*"

Rand Afrikaans University

Ms M du Toit

Onderwyslinguistiek (Faculty of Education and Nursing)

Title: "*Die aard van Technikon Noord-Transvaal-studente se sone van naasteontwikkeling in Afrikaans Vreemdetaal*"

Rhodes University

Miss LA Collett

M.Sc. (Chemistry) (with distinction)

Title: "*Structural and Stereochemical investigations of terrestrial and marine pyrone metabolites*"

University of Stellenbosch

Mr SWP Esterhuyse

M.Eng. (Mechanical) (*cum laude*)

Title: "*The influence of Geometry on Dragline Bucket Filling Performance*"

University of the Transkei

Mr S Tyiso

M.Sc. (Botany) (*cum laude*)

Title: "*A study on the germination of Flagellaria guineensis seeds*"

University of the Witwatersrand

Ms SL Green

M.Sc. (Microbiology) (with distinction)

Title: "*Molecular variation of the high affinity immunoglobulin E Receptor, C1 Esterase inhibitor, Protease and Protease inhibitor genes in atopic asthmatics and control individuals*"

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