



Southern Africa Association for the Advancement of Science  
Suider-Afrika Genootskap vir die Bevordering van die Wetenskap

# Rudolf Marloth Brochure - Brosjure

**Annual award ceremony: November 2005**

## ***The South Africa Medal (gold): Awarded to Professor Ralph Kirsch and Professor Michael Wingfield***



*Prof Ralph Kirsch*

The South Africa Medal (gold) is awarded annually to recognise exceptional contributions to the advancement of science on a broad front or in a specific field, by an eminent South African scientist. For the first time since this award was instituted in

1908 (when the recipient was the eminent veterinary scientist Sir Arnold Theiler) Council decided to award two gold medals in 2005. Professor Ralph Kirsch received this prestigious award for his important and sustained research in the field of internal medicine. Professor Michael Wingfield was awarded the South Africa Medal in recognition of his ground-breaking research on forest diseases. Summaries of their careers and Marloth Commemorative Lectures are provided below.

**Professor Ralph Kirsch** grew up on a farm near Wolseley in the Boland. He studied medicine at the University of Cape Town (UCT) and graduated MB ChB in 1964 and MD in 1968. Following his specialization in internal medicine he obtained the Fellowship of the College of Physicians of South Africa in 1970. He spent 1972 and 1973 as a Research Fellow in the Division of Gastroenterology and Liver Diseases of the Albert Einstein College of Medicine in New York.

Ralph Kirsch was one of the first three recipients of the UCT Distinguished Teachers Award. He is also an elected Fellow of the UCT, in recognition of his original and distinguished academic work. He was awarded a DSc(Med) by UCT in 1993. From 1980 to 2004 he was Executive Director of the MRC/UCT Liver Research Centre. His research interests include: haem metabolism and the porphyrias, protein synthesis and catabolism in health and disease with

special reference to albumin and fibrinogen, the effects of fibrinogen degradation products on lymphocyte and neutrophil function, immune dysfunction in liver disease, the structure and function of the glutathione S transferases, and various aspects of liver physiology and disease.

Professor Kirsch is currently Director of the School of Adult Clinical Medicine at UCT; Professor and Head of the Department of Medicine; and Chief Specialist, Department of Medicine, Groote Schuur Hospital. He has been President of the Colleges of Medicine of South Africa, the Cape Western Branch of the South African Medical Association, the South African Association for Medical Education, the South African Gastroenterological Society and the African Association for the Study of Liver Disease. He is an Honorary Fellow of several overseas Colleges of Physicians, and the recipient of many medals and other awards.

Professor Kirsch is the author of 452 publications, including 199 papers in international

medical journals, and has edited 6 books. His wife Beverley (BA, UCT) is co author of 6 books on African Languages, while their sons David (MB ChB), Richard (MB ChB, PhD, FCPATH) and Derek (BSc Mech Eng, BCom) are all alumni of the University of Cape Town.



*Prof Kirsch receives the SA Medal (gold) from the President of S<sub>2</sub>A<sub>3</sub>, Dr Ian Raper*

## **Summary of the Marloth Memorial Lecture by Professor Kirsch: Variegate Porphyrria from Man to Mouse**

Geoffrey Dean, a Port Elizabeth physician, was the first to appreciate that porphyria was common in South Africa. In the early 1950s he saw several patients of Dutch descent with acute episodes of abdominal pain followed in some by paralysis and death. The patients had skin lesions in areas exposed to the sun and this photosensitivity was familial. During the acute episodes patients passed red urine which Dean and Barnes found to be due to porphyrins. Dean was able to trace the condition to an orphan, Adriaantje Adriaanse, who arrived at the Cape in 1688. He named it variegate porphyria (VP). It is the commonest monogenic inherited disease in South Africa and our Centre sees roughly 150 new cases every year.

The porphyrias are metabolic disorders which result from defects of specific haem synthetic enzymes with accumulation of intermediates proximal to the block. Intermediates in the distal part of the pathway, the porphyrins, are associated with skin lesions while early haem precursors aminolevulinic acid (ALA) and porphobilinogen (PBG) are associated with acute attacks. Owing to a defect in the penultimate haem synthetic enzyme protoporphyrinogen oxidase (PPO), VP is characterized by both skin lesions and acute attacks. Peter Meissner, Paul Adams and I postulated that the products accumulating as a

result of the inherited PPO defect inhibited a second enzyme, porphobilinogen deaminase (PBGD), resulting in increased ALA and PBG. Using pure PBGD we were able to demonstrate that proto and coproporphyrinogens inhibited PBGD. The inhibition renders PBGD rate limiting and predisposes VP subjects to accumulation of ALA and PBG and hence to acute attacks.

The next major advance came with the sequencing of PPO. The availability of the human gene structure allowed our Centre, together with colleagues in Athens, Georgia and Cardiff, to look for mutations in South African patients. Our initial studies were on a patient who was found to have a C to T transition in codon 59 (exon 3) (R59W), resulting in an arginine to tryptophan substitution, and a C to T transition in codon 168 (exon 6) (R168C), resulting in an arginine to cysteine substitution. The R59W mutation was present in her mother while the R168C defect was present in her father. Subsequent studies showed that the R59W mutation is present in approximately 95% of South African VP families studied. This strongly suggests the presence of a founder effect.

Genetic testing has allowed the early diagnosis of persons in families with the R59W defect. Today the proportion of life long asymptomatic VP subjects has increased from 10 to 62%. Treatment of acute attacks

has decreased the number of patients who become paralysed from more than 50% to less than 10%.

**Professor Michael Wingfield** was born and educated in South Africa. In 1983 he completed a PhD in Plant Pathology at the University of Minnesota, specialising in forest pathology and entomology. Upon his return to South Africa he established the first formal, forest pathology programme in the country, required to serve a rapidly expanding plantation industry. In 1988 he became a full professor and member of Senate at the University of the Free State and, together with industrial partners, established the Tree Protection Co-operative Programme (TPCP). This is now one of the best recognised tree protection groups in the world.



*Prof Micheal Wingfield receives the SA Medal (gold) from Dr Ian Raper*

In 1998 Professor Wingfield became the founder Director of the Forestry and Agricultural Biotechnology Institute (FABI, University of Pretoria), which now houses the TPCP and other internationally recognised plant biotechnology programmes. He is passionately committed to the study of tree diseases, particularly those of importance to plantation forestry. He has published widely on this topic in journals (in excess of 400 papers in peer reviewed journals), congress proceedings and in three books,

is a committed teacher and has been advisor or co-advisor of some 35 PhD students, many now independently recognised scientists.



*Prof Wingfield and guests at the 2005 awards ceremony*

Professor Wingfield has served in many distinguished positions and received numerous awards and honours for contributions to education and industry, in South Africa and elsewhere in the world. He is a Fellow of the Royal Society of South Africa and the Southern African Society for Plant Pathology, a member of the Academy of Sciences of South Africa (ASSAf), serves on the scientific advisory committee (WeCo) of the Dutch Centralbureau voor Schimmelcultures and on the board of the International Union of Forestry Research Organisations, was appointed to the board of the Council for Scientific and Industrial Research (CSIR) by the minister of Trade and Industry, and serves on the Research Committee of the Hans Merensky Foundation.

Professor Wingfield enjoys lecturing on tree pathology topics and does so internationally, while also acting as an advisor to significant forestry organisations, universities and institutes. He is married to Brenda, who is a Professor of Genetics and with whom he also collaborates scientifically. They have two children, Anthony (19) and Beverly (15) who add a very different and non-scientific dimension to their lives.

## **Summary of the Marloth Memorial Lecture by Professor Wingfield: World forests increasingly threatened by invasive pests and pathogens.**

It is surprising that the threat of alien invasive insect pests and pathogens to the world's forests was not recognised for a very long time. From a forest pathology standpoint, the first well documented examples of devastating incursions of pests and pathogens into woody ecosystems date back to not much more than 100 years ago. One of the

best known of these alien invasions is that of the devastating chestnut blight, caused by *Cryphonectria parasitica*, which was first recorded in the United States in 1905 and had spread to Japan 40 years later. In not much more than fifty years this pathogen, vectored by fungi eating nematodes, decimated one of the most important forest species in the eastern United States and it continues to impart serious

damage to chestnut forests in Europe. We know today that the pathogen originated in Southeast Asia and that its dreadful impact is directly linked to its accidental introduction into North America and Europe. The causes and mechanisms of the disease were elucidated by research commencing around 1970.

Many other similar tree disease and insect pest epidemics have followed, including Dutch elm disease in Europe and North America (*Ophiostoma ulmi* and *O. novo ulmi*, vectored by Scolytine bark beetles), white pine blister rust (*Cronartium ribicola*) in North America, and pine wilt caused by the pine wood nematode *Bursaphelenchus xylophilus* and its associated Cerambycid beetle vectors in Japan and South East Asia. Similar new diseases and epidemics continue to appear in the northern Hemisphere and most can be linked to trade in forest products.

Such epidemics are less well known in the Southern Hemisphere, probably because of lower levels of movement of people and products in this area. There is, however, good evidence to show that this is a situation that is changing rapidly. For example, a *Sirex* wood wasp became established in South Africa in 1994 and is already devastating our pine trees. I consequently foresee new and devastating forest disease problems in many parts of the world, including South Africa. These pests and diseases are likely to have a serious negative impact on forests, forestry and society, and appear to be an even greater threat than uncontrolled logging. Although it is depressing to accept the fact, this predicted course of events will probably not be stopped, but it can be slowed and managed through wise investment in research and legislation to reduce the movement of alien invasive tree pests and pathogens.

## Bronze Medals awarded during 2005

The Association's Bronze Medals serve to commend outstanding South African science students graduating at the Masters level. During 2005 medals were awarded to the following students:

**Central University of Technology, Free State:**

Dennis Raymond Willemse, MTech (Electrical Engineering): *"Investigation into the possibility of using partial discharge measuring equipment to diagnose faults on 3.3 kV electrical machines."*

**Northwest University:** Christo Venter, MSc (Physics): *"The effect of general relativistic frame dragging on millisecond pulsar visibility for the H.E.S.S. telescope."*

**University of Johannesburg:** Ockmer Louren Oosthuizen, MSc (Computer Science): *"A multi-agent collaborative personalized web mining system model."*

**Rhodes University:** Genevieve James, MSc (Human Kinetics and Ergonomics): *"The effects of personalised adjustments to computer workstations on the efficiency and physical comfort of computer operators."*

**University of the Free State:** Olihile Moses Sebola, MSc (Microbiology): *"The lipid composition of the yeast genus *Saccharomycopsis* Schönning."*

**University of the Witwatersrand:** Wen-Chi (Angel) Kuo, MSc (Mathematics).

**Tshwane University of Technology:** Mercia Kebonetsala Lemme, MTech (Chemistry): *"Vapor absorption spectra of sulfur compounds in graphite electrothermal vaporizers for atomic absorption spectrometry."*

**Durban Institute of Technology:** Lerosha Govender, MTech (Biotechnology): *"Partial characterization of toxigenic *Fusarium*".*

**Nelson Mandela Metropolitan University:** Simon A. Schumacher, MSc (Physics): *"A photoluminescence study of  $Cu(in Ga)(S, Se)_2$  thin films"*.

**University of Pretoria:** Jonika Marx, MSc (Anatomy [cell biology]): *"Investigation of the cytotoxic potential of aqueous extracts of *Dicerocaryum zanguebarium* and *Urginea sanguinea* in vitro."*

**University of KwaZulu-Natal, Durban Campus:** Ai-N-I Hsieh, MSc (Mathematics and Statistical Sciences): *"Loghics with the mingle and contraction axioms."*

**University of KwaZulu-Natal, Pietermaritzburg Campus:** Sandra D. Strydom, MSc (Chemistry): *"Synthesis and structural characterization of Tin(IV) porphyrin phenoxide complexes and Schiff base derivatives for the polymerization of epoxides."*

**University of Natal, Westville Campus:** Ramona Moodley, MSc (Microbiology): *"Molecular typing of *Vibrio cholerae* isolates recovered during localized outbreaks of cholera in KwaZulu-Natal, South Africa (2000-2001)."*

**University of Cape Town:** Antony Michael Millner, MSc (Applied Mathematics): "Non-communicative phenomena in flat and curved space-times."



Mrs Shirley Korsman, Secretary of S2A3, with one of the guests at the award ceremony

**University of Stellenbosch:** Johannes Nicolaas Kriel, MSc (Theoretical Physics): "Non-perturbative flow equations from continuous unitary transformations."



Professor Kirsch and guests

## Report of the President, Dr Ian Raper, for 2005

It gives me pleasure once again to look forward, with my colleagues on the Council and members, to future years of the Association's established activities, and to report on the achievements of the past year.

The Bronze Medals awarded by the Association during 2005 are listed elsewhere in this brochure. These awards offer a unique opportunity for tertiary institutions to recognise the research achievements and encourage senior students at the masters' level. Where  $S_2A_3$  awards are made, the principle is paramount that recipients must be deserving and truly exceptional. Our criteria are unshakeable: only scientific excellence is a qualification.

A somewhat disconcerting trend has been that representatives of  $S_2A_3$  Council are not always invited to the institutions to present the medals, which is actually a condition of the award. We have seen how much it means to recipients and members of the Faculty to have a Council member present for the award.

Current paid-up  $S_2A_3$  membership as at 1 November this year stands at 83, compared to 94 in 2004. Courtesy membership of one year extended to Pretoria Branch speakers is not included. The decline in membership is significant. The question is often asked what the benefit of membership is, and the

Council will have to examine possibilities of increasing the dynamics of the Association so as to attract members.

In the light of ecological crises in the country, I am investigating collaboration with a non-profit international environmental organization based in South Africa. There are many exciting projects and products being applied to environmental problems, for example elephant contraception to ward off the possibility of extensive elephant culling in the Kruger Park, microorganisms for use in flood ravaged areas, etc.

I would like to invite any interested and willing paid-up members to offer their services and volunteer to be co-opted onto the  $S_2A_3$  Council or the Pretoria Branch Committee. Also for members to submit any ideas they may have for taking us to greater heights of activity and involvement without compromising our independence or our focus on the advancement of science.

### Lectures arranged by the Pretoria Branch

Our heartfelt thanks to the Pretoria Branch Committee for organising the following extremely interesting and well received series of lectures during 2005 at the Discovery Centre, University of Pretoria.

*Quantum personalities* (2 March), by Professor J. Boeyens, Extraordinary Professor, Department of Chemistry, University of Pretoria. At the centenary of Einstein's most productive year, a year that also provided a firm basis for quantum theory, the speaker looks back at the personalities involved in the development of quantum theory between 1905 and 1935.

*Nutrition: Facts and fiction* (6 April), by Dr J. Kotze, Specialist food and nutrition consultant. Questions of general interest addressed in this lecture included: Is saturated fat the cause of heart disease? What is the effect of trans-fatty acids on heart disease? What is the function of cholesterol in the body? and, Should we eat a high-carbohydrate diet?

*Past climate changes and human habitation in southern Africa* (4 May), by Dr Ina Plug, Research Fellow, University of South Africa. Climate changes during the Pleistocene are reflected in the characteristics of recent sedimentary deposits. Archaeological studies of the variable distribution of prehistoric humans, wild animals, and later domestic animals, indicate that even small climatic changes had profound effects on human and animal life.

*New frontiers in biology: Bioinformatics leads the way* (1 June), by Dan Jacobson, CEO of the National Bioinformatics Network. Bioinformatics is an exciting new discipline at the intersection of biology, computer science, mathematics and statistics. It involves the use of computers to manage and analyse huge amounts of biological data, made the Genome projects possible, and is the underpinning of studies to understand how all the components of a cell work in concert.

*Social parasitism by Cape honeybee workers: understanding evolutionary lotteries* (3 August), by Professor Robin Crew, Vice Principal, University of Pretoria. Following the introduction of Cape honeybee colonies into Gauteng in the 1990's, Cape honeybee workers invaded colonies of local honeybees and destroyed them through a process of social parasitism. Genetic and pheromonal studies have explained why social parasitism is so successful in this case, and what its implications are for biodiversity of local populations.

*What's wrong with the bones, Holmes?* (7 September), by Dr Jan Rijn Zeevaart, Head of the Department of Radiochemistry, NECSA. Contrary to popular belief our skeleton is not a dormant structure, but an active organ that is constantly being remodeled. Mishaps during natural bone replacement lead to osteoporosis, Paget's disease, and bone metastasis. The speaker explained how these anomalies originate and how they can be treated.

## **S<sub>2</sub>A<sub>3</sub> remembers**

Our condolences to the family and friends of the following S<sub>2</sub>A<sub>3</sub> members who recently passed away:

Dr N. Stutterheim (1915-2005), who joined the Association in about 1938 and was awarded the SA Medal (gold) in 1986.

Mr M.A.S. Corke, Headmaster at St Barnabas College for 31 years. He was a member from before 1966 to 2000.

Prof H.P.A. de Boom, a Life Member of the Association since before 1966.

## **A word of thanks**

May I also express our thanks to the following:

- S<sub>2</sub>A<sub>3</sub> Council members and the Pretoria Branch members for their dedication and hard work during 2005; without them S<sub>2</sub>A<sub>3</sub> would cease to function

- Mrs Esme den Dulk and her helpers for their catering arrangements at the Annual Awards Ceremony

- The Marloth Trust for financing the Annual Awards Ceremony and Marloth Brochure

- Professor Cornelis Plug for producing the Marloth Brochure; also for his extremely interesting contributions to the Pretoria Branch Newsletter during 2005.

- Creamer Media Pty Ltd for publishing an advertisement of the Association free of charge in their journal Engineering News and Mining Weekly.

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**Next Page:** *Forty years ago. Delegates attending the 63rd Annual Congress of the South African Association for the Advancement of Science, held in East London in 1965. The President that year was Dr Raimond H. Marloth, son of Dr H.W. Rudolf Marloth who was President in 1914 and after whom this brochure was named.*



# **The S<sub>2</sub>A<sub>3</sub> National Council**

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## **Contact us**

Persons who support the advancement of science are invited to become members of S<sub>2</sub>A<sub>3</sub> at an annual individual membership fee of R70 per person (R30 for students). Corporate membership is available at R500 p.a. Please contact the Secretary, Mrs SA Korsman, at:

P.O. Box 366, Irene 0062

Tel: 012-667 2544

Fax: 012-667 2544

E-mail: [s2a3@global.co.za](mailto:s2a3@global.co.za)

Visit our website at <http://s2a3.up.ac.za>

Consult the S<sub>2</sub>A<sub>3</sub> biographical database of southern African science at <http://s2a3.up.ac.za/bio/Main.php>