



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 2004

The South Africa Medal (gold): Awarded to Prof Pieter S Steyn



Prof Pieter S Steyn

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. Prof Steyn received this prestigious award in recognition of his important contributions to the study of mycotoxins. The following is a summary of his life and work.

Pieter Streicher Steyn was born on 5 January 1940 at Vryburg, Northern Cape. He was awarded the BSc degree (Chemistry and Geology) by the University of Stellenbosch in 1959 and the MSc degree (cum laude) in Chemistry in 1963. Three years later the University of South Africa awarded him a PhD for a thesis titled *Chemical studies related to Aspergillus ochraceus Wilh.*

He joined the National Chemical Research Laboratory (NCRL) of the CSIR in 1964. During 1967-1968 he was a post-doctoral fellow at the School of Pharmacy, University of Wisconsin, investigating antitumour substances derived from plants. He became Head of NCRL's Division of Organic Chemistry in 1983. In 1986 he was appointed Director of the CSIR's Division of Food Science and Technology. A few years later he was a member of the CSIR top management team, and had been appointed its first Fellow - the highest career position in science at the institution.

In 1993 he left the CSIR to become Head of the SASOL Centre for Chemistry and SASOL Professor of Chemistry at Potchefstroom University, where he played a prominent role in research management. From Potchefstroom he returned to his alma mater at Stellenbosch in 1999, first as Director of Research (Natural Science), and soon as Professor of Chemistry and Senior Director: Research, positions that he still holds.

Throughout his succession of senior positions Professor Steyn maintained a very strong research

record. His career was largely devoted to the isolation, analysis, structure elucidation, synthesis, and biosynthesis of mycotoxins (toxins produced by fungi that are toxic to mammals). This research was undertaken in collaboration with research groups in South Africa, Australia, New Zealand, continental Europe, the United Kingdom, Japan, and the United States. He is the author or joint author of 190 scientific papers and reviews and made seminal contributions to the chemistry of mycotoxins, to the application of stable isotopes in the study of the biosynthesis of fungal secondary metabolites, as well as to the application of the principles of biosynthetic architecture in the structure elucidation of the penitrem, a group of labile highly complex metabolites. With his research group at the CSIR he also played the key role in the structure elucidation of several unique toxic bufadienolides of the Crassulacea, by the application of very high field NMR spectroscopy.

Professor Steyn served on the editorial boards of several scientific journals and was the editor of a number of special issues and monographs. He has been (and still is) an office bearer in many scientific societies and organisations. For example, he is an A-rated researcher; a Fellow of the Royal Society of South Africa and currently a member of its Council; a founding member of the Academy of Science of South Africa; played an active role in the Council and committees of the South African Chemical Institute; served the International Union of Pure and Applied Chemistry in various official roles, among others as its President in 2002-2003; and was President of the International Association for Cereal Science and Technology (1992-1994). Among other honours he has been awarded the Gold Medal of the South African Chemical Institute (1987), the CSIR Merit Prize (1987), the Havenga Gold Medal for Chemistry (1992), and the Hendrik van Eck Medal of the South African Chemical Institute.

Summary of the Marloth Commemorative Lecture by Prof Steyn: From mycotoxins to the international world of science



Prof Steyn receives the SA Medal (gold) from the President of SZA3, Dr Ian Raper

Mycotoxins are a chemically heterogeneous group of low molecular weight compounds that are produced by the secondary metabolism of fungi. The diseases caused by the ingestion of mycotoxins are called mycotoxicoses. The mycotoxins are mostly produced by the so called storage fungi. Some unique mycotoxicoses, such as ergotism, lupinosis and facial eczema, are caused by some parasitic and saprophytic fungi.

The resurgence of interest in mycotoxin research is directly related to the discovery during the 1960s of the aflatoxins and their role in the aetiology of

primary liver cancer in humans. The aflatoxins are a group of structurally related hepatocarcinogens produced on nuts and cereals by *Aspergillus flavus* and *Aspergillus paraciticus*. It is noteworthy that the high incidence of primary liver cancer amongst humans in certain parts of Africa, in particular Mozambique, was directly linked to the high level of contamination of local foodstuffs by aflatoxins.

Professor Steyn and his research team at the CSIR identified more mycotoxins than any other research organisation in the world. They focused their research on the isolation, structural elucidation and biogenesis of these fascinating compounds, such as the aflatoxins, ochratoxin A (carcinogenic and nephrotoxic), penitrem A (neurotoxic), phomopsis

A (hepatotoxic), fumonosin B1 (carcinogenic), and zearalenone (estrogenic). The highlight of the research was the elucidation of the structure of the penitrem as well as that of a number of structurally related tremogenic mycotoxins by the application of very high field nuclear magnetic resonance spectroscopy and the principles of biosynthetic architecture.

Professor Steyn also discussed the transformation of the International Union of Pure and Applied Chemistry from a commission driven organisation to a vibrant modern project driven organisation, a process in which he played a significant part.

Merit certificates

The Association's merit certificates are awarded to persons or institutions who have contributed, each in their own way, to either the advancement of science or the Association's activities. Two awards were made in 2004.

Prof Bruce Robertson



Prof Bruce L Robertson

Professor Robertson was awarded a merit certificate for his extensive research in botany, his contributions to research management,

and his services to the Association as Vice-President for the Eastern Cape region, a position from which he retired at the end of 2004.

Bruce L Robertson completed the BSc(Agric) and MSc(Agric) degrees at the University of Pretoria, both with Horticulture as major subject. He worked for the Department of Agriculture from 1965 to 1971 before he joined the University of Port Elizabeth (UPE) as a lecturer in the Botany Department. Three years later he completed his PhD with a thesis on one of South Africa's rarest plants, the palm species *Jubaeopsis caffra*.

Initially his research was on embryology and reproduction in plants. However, as the research focus of UPE's Botany Department became more marine oriented he gradually switched his attention to seaweeds. In 1988 he became the Director of the SAB Institute for Coastal Research at UPE, leading multidisciplinary research on various coastal systems. His last eight years in the Botany Department were devoted to research on growing seaweeds in commercial, integrated, land based mariculture systems with abalone. In 1999 he was appointed as UPE's first Director of Research, a position he still holds.

Professor John Skinner



Prof Skinner receives a merit certificate from Dr Ian Raper

Professor Skinner was awarded a merit certificate in recognition of his important contributions

to mammal research in southern Africa.. S2A3 has supported his research by means of the W.H. Craib Memorial Research Grant from its inception in 1992 to the present.

John Dawson Skinner was born in Johannesburg in 1932. He obtained a BSc (Agric) degree in Animal Science at the University of Natal in 1955 and after some years at Mara Agricultural Research Station in the Limpopo Province was awarded the Msc degree (with distinction) by the University of Pretoria for a thesis on the effects of high ambient temperatures on spermatogenesis in the Africander and Friesian bulls. His PhD studies at Cambridge University focused on puberty in farm animals. After some time as Head of the new Reproductive Physiology Unit at the Irene Animal Production Institute, he became Director of the Mammal Research Institute at the University of Pretoria. From 1985 to 1994 he was also Head of the Department of Zoology. As a research fellow or visiting professor he has worked at the Israel

Academy of Science and the University of Tel-Aviv (1977), at Oxford University (1978), the University of Queensland (1980), the University of Dublin (1994), and intermittently at the University of Cambridge.

Professor Skinner is currently Vice President of the Royal Society of SA, and editor of its *Transactions*. He has published some 300 scientific papers on mammalogy, ecology, ethology, taphonomy, environmental physiology and endocrinology of

mammals, as well as 30 book chapters and books. After his retirement he took up a position as Professor Extraordinaire at the Veterinary Wildlife Unit. He has received many awards for scientific achievement and service to science, including the Silver Medal (Research) of the South African Society of Animal Production, the Senior Captain Scott Medal of the Biological Society of South Africa, and the Gold Medal of the Zoological Society of Southern Africa.

Bronze Medals awarded during 2004

The Association's Bronze Medals serve to commend outstanding South African science students graduating at the masters level. During 2004 medals were awarded to the following students:

Rhodes University: Amanda Morgan Ellis, MSc (Zoology): *An assessment of density estimation methods for forest ungulates.*

North-West University: Gordon Wayne Towers, MSc (Molecular Human Genetics): *Molecular screening of the Calpain I0 and Adiponectin genes in a black Type 2 diabetic South African population.*

Port Elizabeth Technikon: Christof Böttcher, MTech (Mechanical Engineering): *An automotive carbon dioxide air-conditioning system with heat pump.*

Rand Afrikaans University: Michiel Olivier De Kock, MSc (Geology): *Selected magnetostratigraphic studies in the main Karoo basin (South Africa): Implications for mass extinction events and the supercontinent of Pangea.*

University of the Free State: Pieter Rutger Taljaard, MSc (Agricultural Economics): *Econometric estimation of the demand for meat in South Africa.*

University of the Western Cape: Morne Graham Du Plessis, MSc (Biochemistry): *The use of mouse regions syntenic to the PFHBI region for identifying novel genes and the mutation screening of a candidate gene[s].*

University of the Free State: Tania Venter, MSc (Microbiology): *The production of citric acid by Yarrowia lipolytica when cultivated on edible and waste fats.*

University of the Witwatersrand: OPM Horwood, MSc (Chemistry): *Solid state isomerisation reactions of six co-ordinate ruthenium complexes.*

Medunsa: Mahlatse Lucky Moropeng, MSc (Medical Virology): *Investigating the effect of HIV co-infection on HBY detection in South Africa.*

Durban Institute of Technology: DE Stephens, MTech (Biotechnology): *Directed evolution of b-xylanase from Thermomyces lanuginosus.*

Tshwane University of Technology: Dirk Jacobus Greyling, MTech (Veterinary Technology): *The use of disodium etreaborae decahydrate for the*

control of three ectoparasites in poultry houses.

University of Port Elizabeth: Timothy Gibbon, MSc (Physics): *The measurement of polarization mode dispersion in an optical fibre.*

University of Pretoria: Gordon Andreas Wells, MSc (Biochemistry): *Structural model and properties of the adoMetDC domain of the bifunctional plasmodium Falciparum S-adenosylmethionine decarboxylase / Ornithine decarboxylase.*

Central University of Technology, Free State: Dennis Raymond Willemsse, MTech (Electrical Engineering): *Investigation into the possibility of using partial discharge measuring equipment to diagnose faults on 3.3 kV electrical machines.*

University of Cape Town: Rebecca Anne Rademeyer, MSc (Applied Mathematics): *Assessment of and management procedures for the hake stocks off Southern Africa.*

University of KwaZulu-Natal, Durban Campus: Jolyon Steven Clulow, MSc (Mathematical and Statistical Sciences): *The design and analysis of cryptographic application.*

University of KwaZulu-Natal, Pietermaritzburg Campus: Desigan Reddy, MSc (Chemistry): *An investigation into the effects of donicity and the role of cyclometallation on the reactivity of polypyridyl and amine complexes of platinum [II].*

University of KwaZulu-Natal, Westville Campus: Mzolisi Ntshahla Shezi, MSc (Chemistry): *Development of a Delphi based program to simulate complex chemical kinetic reaction mechanisms and optimize the estimated rate constants.*

Stellenbosch University: Shivani Ghorun, MSc (Medical Physics): *The influence of reconstruction and attenuation correction techniques on the detection of hypo-perfused lesions in brain SPECT images.*



Mrs Esme den Dulk, who initiated the Marloth Brochure in 1989 and compiled it annually to 1996. She is still an active and enthusiastic member of Council



Dr Armando S M de Jesus at the awards ceremony



Dr Elise Venter, Treasurer of the Pretoria Branch and former member of Council



Prof Steyn with some of the guests at the 2004 awards ceremony

Report of the President, Dr Ian Raper, for 2004

I am happy to report to the membership of the Association on behalf of the National Council. Once again we have registered a successful year. Our activities have achieved their goals: paying tribute by means of our awards to excellence in scientific achievement, providing incentives to younger researchers, and bringing to the public's notice developments in a range of scientific terrains by means of monthly lectures.

While on a trip to the United Kingdom in September, Engela and I paid a visit to the London headquarters of the British Association, under whose auspices our founding took place in 1902. Although many of the

senior office bearers were in Exeter at this year's Science Festival, we were very cordially received by Mr. Philip Wilson and the staff. Their premises in Queens Gate are impressive, and are situated among august scientific museums and societies. The BA, as it is generally known, facilitates a university science festival every four years, rotating among the participating universities. It has a substantial budget based largely on donations (Philip is the head of fund raising), is registered as a charity and receives a grant from the government. Our visit should be regarded as an historic occurrence, and we hope it paves the way for more contacts.

S2A3 remembers

One of our members, Mr Peter B Power, passed away on 27 July 2004. Our condolences to his family and friends. In 2001 Mr Power donated a set of *Reports of the South African Association for the Advancement of Science* to Council, which are now housed in the Africana Library, University of Pretoria.

Lectures arranged by the Pretoria Branch

Our sincere thanks to the committee of the Pretoria Branch for organising the following extremely interesting and well received lectures held during 2004 at the Discovery Centre, University of Pretoria.

An overview of chemical defence R&D in South Africa (7 April), by Dr Phil Coleman. The lecturer provided an overview of defensive measures used against both chemical warfare agents and toxic chemicals, and outlined the research and development work performed by Protechnik Laboratories in this area.

Handling of computer viruses at the University of Pretoria (5 May), by Dirk Robinson. A discussion of computer viruses and the measures taken by the Information Technology Department to protect computer users from the threat they pose. Attention was also given to the steps that computer users can take to prevent infection.

Venus, morning and evening star (8 June), by Louis Barendse. On 8 June 2004 the planet Venus could be seen moving as a black dot across the face of the sun, an event that last happened in 1882. The transit was observed through telescopes set up by members of the Astronomical Society of South Africa. The event was further celebrated that evening, in conjunction with the Discovery Centre of the University of Pretoria, by Louis Barendse's talk, followed by a cheese-and-wine reception.

The ancient Egyptian weighing of the soul and its meaning for modern civilization (4 August), by Professor C.J.H. Schutte. The development of the commercial double-pan balance in Egypt between 2600 and 1500 BC, based on illustrations from papyri and rock-engravings. The act of weighing and the terminology of the balance led to the symbolic weighing of responsibility and truth by weighing the heart of the deceased, as depicted in various mortuary papyri. An analysis of one such illustration showed how the scene still influences our modern world.

The electronic library of the future (1 September), by Mrs Els ten Kroonden. The internet has profoundly changed the role of libraries and the way that scientists communicate, work and publish. The implications of this revolution in

the world of publishing were discussed, with reference to open access, archiving, copyright, and the retrieval of information. From the electronic trends of today, Mrs ten Kroonden was able to make projections into the future e-library.

Marion Island (6 October), by Deryck Yelverton. Marion Island is a jewel in the sub-Antarctic ocean where sun, snow, rain and storm can all occur in one day. Its plains of short grass, undulating fern-covered hills and snow-capped mountains provide a home to the wandering albatross and gentle storm petrels. In this remote place South African scientists seek to understand our world better. Mr Yelverton discussed what has been found, what current research hopes to unveil, and illustrated his lecture with numerous fascinating photos.

The S2A3 biographical database

During 2004 the first installment of the S2A3 biographical database of southern African science was placed on the web at <<http://s2a3.up.ac.za/bio/Main.php>>. It contains biographical information on some 700 persons. Additional biographies will be added during 2005.

Other activities

As President I would also personally like to thank:

- Members of council and the Pretoria Branch committee members for their dedication and hard work during 2004. Without them the Association would no longer function or exist
- Mrs Esme den Dulk and her helpers for their splendid arrangements for the awards ceremony and Annual General Meeting
- Dr Gerard von Gruenewaldt for his meticulous assessment of the nominations received for the 2004 South Africa Medal (Gold) and British Association Medal (Silver) awards
- The Marloth Trust for financing the annual awards ceremony and the 2003 Marloth Brochure

Next Page: *Forty years ago. Delegates attending the 62nd Annual Congress of the South African Association for the Advancement of Science, held in Kimberley in 1964. The President that year was Professor Govert C. van Drimmelen (1911-2003), veterinary scientist.*



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If you support the advancement of science, become a member of S2A3 at an annual membership fee of R70 per person (R30 for students). Corporate membership is available at R500 p.a.

Interested paid up members are invited to volunteer to be co-opted onto the Association's council or the committee of the Pretoria Branch. Furthermore, if you are involved in scientific activities that may be of interest to a larger public, please bring it to the attention of our secretary, Mrs SA Korsman, at:

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