Southern Africa Association for the Advancement of Science

Rudolf Marloth Brochure 2011

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Annual award ceremony, November 2010

The South Africa Medal (gold): Awarded to Professor Johannes van Staden

The South Africa Medal (gold) has been awarded annually since 1908 to recognise exceptional contributions to the advancement of science on a broad front or in a specific field, by an eminent South African scientist. Professor van Staden received this prestigious award in 2010 for his outstanding contributions to botanical research and research training in botany.

Johannes van Staden was born at Oudtshoorn on 12 October 1939. He studied at the University of Stellenbosch, where he was awarded the degrees BSc (1960), BSc Hons (1961) and MSc (1964) in botany. From 1962 to 1966 he lectured at the University of the Western Cape and in 1967 moved to Pietermaritzburg as a lecturer in the Department of Botany, University of Natal. He was subsequently promoted to Senior Lecturer (1972), Associate Professor (1976), Ad Hominem Professor (1984), and Head of the Department (1987). He held the Chair of Botany until 2003, when he became Emeritus Professor. From 1999 to date he was also Director of the Research Centre for Plant Growth and Development.

Professor van Staden has supervised or co-supervised 75 MSc students (of which 35 passed with distinction), 86 PhD students and 51 post-doctoral candidates.

He has spent periods of sabbatical leave in the United Kingdom (twice), Israel (twice), the United States, and Australia. In collaboration with his colleagues and students about 825 research talks and posters were presented at local and international conferences. He has authored or co-authored more than 1050 refereed papers in national and international journals and is listed by the ISI as one of the most highly cited scientists in the world. He is Editor-in-Chief of the South African Journal of Botany, Editor-in-Chief of Plant Growth Regulation, Managing Editor of the Journal of Ethnopharmacology, and serves on the Editorial Board of five other international journals. He regularly referees proposals for the NRF, acts as referee for about 30 international journals each year, and evaluates research proposals for a number of international bodies.

Professor van Staden is a Fellow of the University of Natal and a Fellow of the Royal Society of South Africa. Of his many awards the most notable are the Kirstenbosch Jubilee Prize for Botanical Research (twice), the Senior Captain Scott Medal, The South African Association of Botanists Senior Medal (Silver), The South African Association of Botanists Gold Medal, The Havenga Prize for Biology, and the Gold Medal of Die Suid-Afrikaanse Akademie vir Wetenskap en Kuns. Recently he was appointed as UNESCO Professor to lecture on Biotechnology in Eastern Europe. The degree DSc (Honoris causa) was conferred upon him by the University of West Hungary and he was elected as an Honorary Member of the Hungarian Academy of Sciences.

Professor Johannes van Staden.

Summary of the 2010 Rudolf Marloth Lecture by Professor van Staden: Fire destroys! - fact or myth? A plant perspective

Fire plays an important role in the evolution of all living organisms, though its evolutionary significance is often overshadowed by economic considerations and emotional responses. I wish to take the stand that fire is one of the most important environmental factors shaping our lives. We need to realise that fire is not only a destructive event. Its one major component - smoke - shapes plant communities, serves as a conservation gate keeper, and regulates growth.

Fire stimulates seed germination, the dry heat having a physical effect on the seed coat and a physiological effect on seed embryos, as well as the dormancy breaking effects of volatile compounds. An important discovery was that cold smoke (smoke water) could induce seed germination (De Lange and Boucher, 1990). Smoke water is prepared by passing the smoke from burning plant material through water. Its effect on seed germination and plant growth can then be compared to the effect of pure water. A subsequent important discovery was that plant-derived smoke is an important germination cue in both fire-prone and non-fire prone species (Van Staden et al. 2000).

The establishment of the Grand Rapid Lettuce seed bioassay (the percentage of lettuce seeds that germinate in the dark) showed that smoke water at high concentrations is inhibitory with respect to seed germination, whereas lower concentrations are stimulatory. The inhibitory effect can be alleviated, while the stimulatory effect cannot be reversed. This suggests that different groups of substances are responsible for the inhibition and promotion of germination, with an antagonistic interaction of compounds.

Smoke is a very complex substance that contains almost 4000 known compounds. Activity-guided fractionation led to the isolation of a highly active compound that was present in minute quantities, and that promoted germination. The compound was identified as a butenolide type compound that is effective over a wide concentration range in the lettuce seed bioassay (Van Staden et al, 2004). Subsequent studies have also isolated another promoter, Karrikinolide 1, and a plant inhibitor, Pyrobutenolide A, in smoke (Light et al. 2010). Although it is currently too expensive to manufacture these compounds commercially, smoke enhancement can be done simply and effectively.

Germination studies showed that both aerosol-treated and smoke water treated seedlings are healthier, taller, and have a better developed root system than control seedlings. This result applies to a wide variety of plants and trees. Smoke treatment can also enhance drought tolerance. The elucidation of the main active principle opens a way forward to a greater understanding of smoke-stimulated seed germination with investigations into the possible modes of action including the following: Activation of the phytochrome system; interaction with plant hormone receptors; influencing the biosynthesis/ metabolism of gibberellins or other plant hormones; promotion of changes in membrane permeability; and activation of enzymes crucial to the initiation of reserve mobilization and the commencement of germination (Van Staden et al. 2000).

Application of this smoke biotechnology has many potential uses in horticulture, especially with respect to indigenous gardening, agriculture, weed control, habitat restoration, and conservation.

Professor van Staden receives the South Africa Medal (gold) from the President, Dr Ian Raper.

The British Association Medal (silver): Awarded to Dr Bernard Slippers

The British Association Medal (silver) was instituted in 1932 and is awarded annually to a scientist under the age of 40 who is actively engaged in research and has, by way of international participation and publications, shown outstanding capability and achievements. In 2010 the medal was awarded to Dr Slippers in recognition of his innovative research on the pathogens of trees.

Bernard Slippers was born in Namibia on 20 May 1972. He studied at the University of the Free State, where he was awarded the degrees BSc (1994), BSc

Hons (1995) and MSc (1999) in Microbiology, all with distinction. His MSc thesis on the Amylostereum symbiont of the Sirex wood wasps was awarded three prizes (including the S2A3 Masters Medal) and formed the basis of four publications in ISI rated journals. His PhD thesis, completed at the University of Pretoria in 2003, dealt with the taxonomy, phylogeny and ecology of the Botryosphaeriaceae, one of the most common groups of stress related pathogens of woody plants. It was awarded the International Union of Forestry Research Organizations (IUFRO) prize for excellence in PhD research and gave rise to seven papers.

After completing his PhD Bernard spent two years as a postdoctoral fellow at the Swedish University of Agricultural Sciences (Uppsala). In 2005 he joined the Department of Genetics, University of Pretoria, as a senior lecturer and was promoted to associate professor in 2009. He received the UP exceptional young researcher award in 2008 and 2009 and was awarded a P-rating by the National Research Foundation, the highest rating for a young scientist.

Bernard's research focus is on aspects of molecular ecology and evolution, chemical ecology of insect-fungal interactions, and tree-pathogen/endophyte interactions. He is particularly interested in the processes that influence the movement, establishment and spread of those insects and micro-organisms that affect tree health. He conducts this research in the largest research group focusing on tree health issues in the world, the Tree Protection Co-operative Program (TPCP) and the related Centre of Excellence in Tree Health Biotechnology (CTHB), where he plays a leading role in research and management.

Bernard is passionate about sharing knowledge and contributing to the development of post-graduate students. He has been or is currently involved as main or co-supervisor of 2 postdoctoral, 13 PhD and 11 MSc students, and has guided projects for numerous BSc Honours students. His research has been reported in some 75 papers in ISI rated journals and in numerous presentations at national and international conferences. He regularly reviews papers for international journals and engages with many other researchers around the world. In 2009 he was selected as Exceptional Young Scientist to attend the Inter Agency Panel of the World Economic Forum at Dalian, China, and as a Young Affiliate of the Academy of Science of the Developing World (TWAS). In 2010 he serves on the Executive Committee of the Global Young Academy.

Dr Bernard Slippers.

Summary of lecture by Dr Slippers: Fascinating interactions: Insects, fungi and tree health

Trees are dominant inhabitants of our landscape and as such are important to the ecology of many other organisms. These organisms include two of the most diverse groups of organisms on earth, the fungi and insects. Humans also depend deeply on trees for food, shade, and wood products. Humans, trees, insects and fungi consequently live in complex symbiotic networks with each other. These interactions represent intricate balances and when these foundations of stability are disturbed, the consequences can be devastating.

In his presentation Dr Slippers explored how modern molecular, ecological and evolutionary tools are promoting a deeper understanding of the interactions between fungi and trees, insects and trees, and symbioses between insects and fungi on trees. He also explained how changes in these interactions can have devastating consequences for tree health, and impact negatively on natural systems and human enterprises that depend on trees. An understanding of the diversity in these systems and the changes that affect them is critical to the effective management

of the risks that insect pests and fungal pathogens pose to tree health. Finally, he described some of the human interactions that have impacted on his scientific development in this field of research.

Dr Slippers's lecture was well-illustrated with examples based on his own research. The work on which he is engaged is of increasing practical and economic importance, as the number of pathogens of trees imported from other countries is rising rapidly. The battle against these pathogens is never-ending, but increasingly sophisticated techniques are developed and employed to combat them.

Dr Slippers and guests at the award ceremony.

S2A3 Medals for Original Research at the Masters Level, awarded during 2010-2011

The Association's Masters Medals (bronze) are awarded annually to the most outstanding research student in a scientific subject, graduating at the masters level, at each South African university. During 2010-2011 medals were awarded to the following students:

University of the Free State (2010)

Charlene Randall, MSc (Microbiology, Biochemical and Food Biotechnology): "Construction of self-sufficient CYP153 chimeras."

University of the Witwatersrand (2009)

Priyanka Anjali Parbhoo, MSc (Computational and Applied Mathematics): "Positive interest, potentials and the pricing kernel."

University of Johannesburg (2010)

Philip Eric Robinson, MEng (Electrical & Electronic Engineering): "Exploration of the mitigation of the effects of terrestrial atmospheric turbulence in long range video surveillance."

University of Johannesburg (2011)

Sandile Bongani Simelane, MSc (Chemistry): "Aluminium triflate mediated reactions of cyclic enol ethers."

Central University of Technology, Free State (2010)

Dreyer Bester, MTech (Clinical Technology): "A study of the effects of warm ischaemic times on harvested homografts."

Nelson Mandela Metropolitan University (2010)

Kim Carey Potgieter, MSc (Chemistry): "Complexes of the ReO3+/Re(CO)3+ cores with multidentate N20 donor chelates."

Tshwane University of Technology (2010)

Ilze Vermaak, MTech (Pharmaceutical Sciences): "Antimicrobial activity and stability of medicinal plant extracts: Effects of simulated gastrointestinal conditions."

Rhodes University (2010)

James Munnik Hamilton Barry, MSc (Physics): "Comparison of A4 neutrino mass models."

Rhodes University (2011)

Candice Leigh Bromley, MSc (Chemistry): "Studies in South African marine molluscan chemistry."

University of KwaZulu-Natal (2010)

Natalie Dawn Mackenzie, MSc (Financial Mathematics): "Real options: Duopoly dynamics with more than one source of randomness."

North-West University (2010)

Roelf Du Toit Strauss, MSc (Physics): "Modelling of anomalous cosmic rays."

University of Stellenbosch (2010)

Beatrix Coetzee, MSc (Genetics): "A metagenomic approach using next-generation sequencing for viral profiling of a vineyard and genetic characterization of Grapevine virus E."

University of Cape Town (2011)

Musa Mlambo, MSc (Zoology): "Biodiversity patterns of wetland macroinvertebrate assemblages in the south-western Cape, South Africa."

University of Pretoria (2011)

Alfons Willi Bogalecki, MEng (Microelectronic Engineering): "Design and manufacture of nanometer-scale SOI light sources."

The Nelson Mandela Metropolitan University awarded the S2A3 Masters Medal to Kim Potgieter, who is currently a PhD student. The medal was presented at a lecture given by Kim on her research in the area of "Rhenium compounds containing benzothiazole derivatives for use as potential diagnostic and therapeutic agents for Alzheimer's disease". The picture shows Kim with Prof Tommy Gerber, her supervisor and Head of the Department of Chemistry, and Ms Jacqueline Barnett, Director: Innovation Support and Technology Transfer.

Report of the President, Dr Ian Raper, for 2010

We in S2A3 pay tribute annually to scientific achievement at various levels, culminating in tonight's ceremony. Here, the highest recognition is the award of the South Africa Medal (gold) and the British Association Medal (silver) to deserving scientists following an intensive programme of selection.

The Council of S2A3 makes grateful use of outside experts for advice, but squarely shoulders the responsibility for final decisions or a decision not

to award a medal in a particular year. The awarding of these medals should never become a matter of routine; that would detract from their value and lessen the prestige they have come to represent over the decades, for more than a century.

During 2010 and the early part of 2011 a number of universities each awarded the S2A3 Medal for original scientific research at the masters level. A list of the institutions and the recipients of the awards appears elsewhere in this brochure. These institutions are our colleagues in promoting the rigour of science and factual discovery in the face of widespread lacks and lapses or misuse of education, unemployment, superstition, fallacy and supposition in the world. Decisions taken to improve the quality of life in societies are in many cases essentially underpinned by benevolent science.

Annual celebrations of Heritage day are held at various places in the country. It seems that no celebration of South African scientists in the past has been held on this day. Even before our Association was founded in 1902, there were important individual and group efforts which established many industries and much infrastructure that our economy depends on today. In fields as diverse as medicine, metallurgy, botany and viticulture, work of world class has been done, often in collaboration with leading scientists elsewhere. As we believe that Heritage day should not highlight differences and divisions, no doubt a celebration of scientists from the past and the present will enable an awareness of our shared debt of gratitude to our scientific predecessors. I would hope that S2A3 may take the lead, together with other scientific bodies, in planning and implementing such celebrations for subsequent Heritage Day festivals.

Paid-up membership of S2A3 as on 22 October 2010 was as follows:

Ordinary members: 55
SAJS members: 10
Life members: 5
Student members: 1
Individual honorary members: 4
Institutional honorary members: 6

We welcome the following new members: Dr Martin Coetzee (UP), Mr Lourens Swanepoel (UP), Prof Anton Stroh (UP), Prof Paxie Chirwa, Mrs Inger Fabris-Rotelli, Ms Marelize van Wyk (NICD), Dr Lizette Koekemoer (NICD), and Mr S Roux.

Six South African scientific societies have accepted honorary membership of S2A3. These societies have each nominated their official representative, who will receive our annual notices, notices of Pretoria Branch Lectures, and a copy of the annual Marloth Brochure, and they will be able to participate in the nominations of suitable outstanding scientists for the two S2A3 awards each year. We hope that this form of honorary membership will foster closer cooperation between scientific societies in the advancement of science and so lead to greater recognition of the vital role that science plays in the economy of the country.

It is with regret that we announce the deaths of two members. Firstly, Mr G.E. Burgess, a member of S2A3 from 1960, who passed away towards the end of 2009. Secondly, Dr Shaleen Els, our former S2A3 Vice-President in the Eastern Cape, who passed away in December 2009.

In order to survive as an association it is essential that S2A3 get extra persons involved with the activities of both the Council and the Pretoria Branch. Please consider offering your help, or mention it to others you may know who have the passion and the time!

I once again thank the Pretoria Branch Committee on behalf of the Council for arranging a number of extremely interesting and well attended Pretoria Branch Lectures at the Sci-Enza Centre, University of Pretoria. These lectures are a vital aspect of the association's existence and constitute a service to education and the public. Details of the lectures are given under a separate heading.

I would like to thank the following S2A3 members for their work during 2010:

- The S2A3 Council Members and the Pretoria Branch Members for their dedication and hard work throughout 2010. Without their willingness S2A3 would not be in a position to function as it does;

- All those S2A3 members who have helped make this evening a splendid success;

- The Marloth Trust for financing the 2010 Annual Awards Ceremony and the 2011 Marloth Brochure which records this event.

Mr Hermann Ortner, who retired as treasurer of S2A3 after many years, is thanked for his services by the President, Dr Ian Raper, at the awards ceremony.

Council member Mrs Esme den Dulk at the awards ceremony. Esme was one of the handful of persons who revived S2A3 in the nineteen-eighties.

Lectures arranged by the Pretoria Branch

"Using maps as a forensic tool" (3 February 2010), by Dr Peter Schmitz, Principal Researcher (GIS and data logistics), Logistics and Quantitative Methods, CSIR. The subject of this talk was illustrated by some of the forensic investigations following the murder of Taliep Petersen, South African musician and playwright, on 16 December 2006. Information obtained from cellular telephone usage indicated where the suspects were when calls were made and received. Their movements could therefore be mapped through time and space. The mapping results were used as forensic evidence and contributed to the conviction of the accused.

"Geo-educating the people" (3 March 2010), by Dr I.C. Schutte, retired geologist and expert on geotourism. The speaker described a project, started in 2005, to document places of geological interest (called geosites) in the Kruger National Park, with a view to compiling a tourist guide. Typical geosites in the park were shown and described, and the interaction between the geology, topography, soils, vegetation and fauna indicated. The ultimate aim of the project is to integrate geology with a nature-based experience through geotourism, leading to the establishment of future geoparks in South Africa.

"Slip-sliding away - The lipid biochemistry of tuberculosis" (5 May 2010), by Professor Jan Verschoor, Department of Biochemistry, University of Pretoria. HIV has brought tuberculosis back as the most serious infectious disease threat to the survival of AIDS patients. The disease is caused by Mycobacteria that feed on cholesterol in the lungs and that have a unique wax coat that protects them from chemical harm. Professor Verschoor and his research group have invented a new TB diagnostic that can help to bring the current TB crisis in South Africa under control.

Although not arranged by the Pretoria Branch, members were invited to a talk by one of our previous speakers, Professor Werner Gries, on "Traditional thinking, physical science, and the brain" (29 July 2010).

"The Anatolian Shepherd guard dog project: Protecting livestock from cheetah attacks" (4 August 2010), by Annie Beckhelling. Cheetah Outreach, a non-profit organisation, initiated a project in 2005 to train Anatolian Shepherds as non-lethal guard dogs to protect livestock on South African farms against predators, particularly cheetah. These dogs have been used for centuries in Turkey to protect against wolves and bears. Their use in South Africa to protect sheep, goats and calves is aimed at the conservation of South Africa's dwindling number of cheetah that range freely across commercial farms.

Members were invited to attend the annual Victor Pretorius Memorial Lecture arranged by the Department of Chemistry, University of Pretoria, on 1 September 2010. The lecture was delivered by Professor Rudi van Eldik and was titled "Understanding inorganic/bioinorganic reaction mechanisms: From fundamental research to edutainment".

"Astronomy during the heydays of Timbuktu" (6 October 2010), by Professor Thebe R. Medupe. Timbuktu, in present Mali, was a major centre of learning during the 1500's. Scholars there studied mathematics, astronomy, jurisprudence, Islam, and other subjects. Professor Medupe heads a project to study astronomical manuscripts from this era. He described the contents of some of the manuscripts,

why these are being studied, and some of the astronomers of Timbuktu that are part of Africa's forgotten academic past.

"A laser unravels the secrets of San rock art" (2 March 2011), by Linda Prinsloo, Department of Physics, University of Pretoria. The paint used in San rock art is believed to contain pigments (charcoal, manganese oxide, haematite, etc), carrying agents (saliva, gall, plant sap, etc), and binding agents (fat, blood, plant resin, etc). Physical analytical methods of analysis enable the researcher to identify some of the components of the paint without having to remove it. The speaker explained and illustrated the techniques she used to reconstruct the "paint box" of San artists.

Members were invited to attend a lecture, arranged by the Northern Transvaal Branch of the Royal Society of South Africa, on 5 April 2011: "Forensic entomology – insects in the service of criminal justice", by Professor Mervyn Mansell.

"Tsunamis: How relevant are they to us in South Africa?" (6 April 2011), by Dr Andrzej Kijko, Director of the Aon Benfield Natural Hazard Centre Africa, University of Pretoria. In this lecture the speaker explained how tsunamis are generated by earthquakes, volcanic eruptions and landslides under the sea, and described and illustrated the devastating tsunamis that occurred in the Indian Ocean in 2004 and along the coast of Japan in 2011. The available information on the seismic history of southern Africa indicates that it is very unlikely (but not impossible) that such a mega-tsunami will hit the shores of South Africa.

The S_2A_3 National Council

Contact us

Persons who support the advancement of science are invited to become members of S2A3. Please contact the Secretary, Mrs SA Korsman, for details of current membership fees and an application for membership form:

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