

THE ROYAL SOCIETY OF SOUTH AFRICA

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REPORT OF THE GENERAL SECRETARY FOR 2005

2005 SCIENCE ESSAY COMPETITION

Entry forms for the 2005 Science Essay Competition were posted to about 500 schools across the country. As anticipated, there was a greatly increased participation in the competition in 2005. On the closing date for entries in April, a total of 448 essays were received, 290 from 87 secondary schools, and 158 essays from 36 primary schools. The latter increase was particularly pleasing.

Professor Luigi Nassimbeni FRSSAf, nominated convener of the Essay Competition, arranged for markers in UCT's Chemistry Department namely: Emeritus Prof. Peter Linder, Dr Eugene Sickle, Dr Bette Davidowitz, Dr. Hong Su, Ms Kirsten Corin, Ms Tanya le Roex and Ms Gaelle Ramon. The Society is indebted to all for their valued contribution. The results were announced in August.

The Society is very grateful to the Claude Leon Foundation for generously providing cash prizes and covering administration costs for the essay competition. Thanks are also due to the Hartebeesthoek Radio Astronomy Observatory (HartRAO), Ithemba Labs, MTN Sciencentre, South African Astronomical Observatory and South African Institute for Aquatic Biodiversity (SAIAB), for being prepared to host essay winners at their facilities, wherever the school's physical proximity permitted. In 2005, thirteen winning scholars were selected on the basis of merit, three for each essay topic (plus one special award) and were able to partake of their prizes, including visits to National Facilities, during the last part of the year. Runners up were given certificates and where possible, prizes/certificates were presented by the Society's Councillors. It is felt that the competition is a very worthwhile project for encouraging interest in science amongst the youth.

Results:

Senior School Essays:

Which science is most needed to improve the quality of life in Africa?

1 st : Mubeen Goolam,	Diocesan College, Rondebosch
2 nd : Meghan Finn,	Crawford College, Pretoria
3 rd : Hannah Connell,	Roedean, Johannesburg

Need I be worried about global warming in my lifetime?

1 st : Tayyaba Bhamgee,	Jeppe High School for Girls, Johannesburg
2 nd : Aneesa Bodiat,	Parktown High School for Girls, Johannesburg
3 rd : Michael Vryenhoek,	Hilton College, Pietermaritzburg

Special prize: Mncube Khambule Sentinel Primary, Witsieshoek.

Topic: Reasons that I believe there might or might not be life elsewhere in the universe.

1 st : Jacky Maesela,	Saulridge High School
2 nd : Trish-Lynn Riley,	Wynberg Girls High School, Cape Town
3 rd : Alexandra Jayne McIlraith	Roedean, Johannesburg

Primary School essays:

Who is my favourite scientist and why?

1 st : Kiaan Pillay-Moodley	Courtney House Learning Centre, Pretoria
2 nd : Zachary Fouche	King David Primary, Linksfield, Johannesburg
3 rd : Heidi Steyn	Laerskool Skuilkrans, Pretoria

ACADEMY OF SCIENCE OF SA (ASSAf)

The Academy is in a healthy financial position, having received a large grant from the American Academy of Science and now has a small number of permanent staff, including Professor W Gevers as CEO. Links have been established with TWAS and with African Academies. The Academy has many very active subcommittees and is successfully producing two journals, *Quest* and the *South African Journal of Science*. The Society is comfortably co-existing with the Academy and sharing the provision of lectures, for which the Academy suggests some speakers, co-hosts meetings and pays half the expenses. The Eastern Cape Branch has also included an Academy representative in the committee for the planning of lectures.

CLAUDE HARRIS LEON FOUNDATION

Three members of Council assisted the trustees of the Claude Harris Leon Foundation by evaluating and grading more than 130 applications for post-doctoral fellowships. The applications were allocated nationally to reviewers. About 50% of the applications were from outside South Africa. As before, the quality of the successful applications was excellent.

For 2006/2007, 28 post-doctoral fellowships were awarded, of which 19 were accepted plus one carried over from a previous year. The total number of fellowship holders in the system is currently 48, with a total budget amounting to R5.25 million.

On 1 September, the Society and Foundation co-hosted the third annual lecture evening in the joint lecture series. The double lecture was fairly well-attended, and saw two of the Fellows selected in 2004, Dr Jean Charpin (Department of Mathematics and Applied Mathematics, University of Cape Town) and Dr Peter Teske (Department of Botany, University of Rhodes) each presenting a lecture describing their research. Their lectures were entitled "Some applications of thin film flows" and "Vicariance, Paraphyly and Long-distance dispersal: modes of allopatric speciation in the sea" respectively.

PROGRESS OF THE ROYAL SOCIETY OF SOUTH AFRICA IN 2005

The RSSAf continued well in its work in 2005. Fourteen new fellows were elected in November 2005, and the August 2005 annual dinner, at which new fellows from previous years' elections were inducted, was a great success. It was addressed by Dr Gerhard von Gruenewald, who both informed and entertained his audience.

The Transactions continued to be published and they received considerable acclaim, to the credit of our determined and hardworking Editor. The Transactions are now listed as a peer-reviewed journal in the world's pre-eminent listing of journals, the ISI Online list, and they are also in the South African Department of Education's list of subsidy-bearing peer-reviewed journals.

The Society's finances continue to be both stable and satisfactory under the eagle eye of its Honorary Treasurer.

A wide variety of activities were undertaken across the country, as is reported in detail below. Good relations were maintained with sister societies, including the new Academy of Science of South Africa.

The Society is now gearing itself up for a fitting series of events to celebrate its hundredth anniversary under its present name, in 2008, although under other names it is much older than that.

As with all progressive science societies, the challenge remains to pass on the torch of scientific enquiry to new generations, and the Royal Society of South Africa is active in this matter too.

Stephanie Roberts was appointed Office Administrator as from February 2006.

BRANCH ACTIVITIES

EASTERN CAPE

Partnerships

In 2004 the Eastern Cape Branch of the RSSA shared the celebration of the Centenary Year with Rhodes University on several occasions. In 2005 it celebrated the 150 years of St Andrews College and the Albany Museum. The partnerships with SciFest and with the East Cape Science Expo continue to flourish and a further important partnership of this year is between the Academy of Science of South African (ASSAf) and the Branch.

Lectures all in partnerships

21 March Prof Neil Turok (Cambridge) : *"The search for a complete history of the Cosmos"* SciFest Lecture in the Guy Butler Theatre.

14 April Dr Rose Prevec (Adendorf)- Amy Jacot-Guillarmod Memorial Lecture *"Glossopteris: A 280 million year old botanical enigma"* Joint RSSA- Albany Museum hosted lecture

8 August Dr Ed Sturrock- Schonland Memorial Lecture *"Toward the Hart of Drug Design"*. Joint RSSA - St Andrews College 150 years celebration lecture. 8 August This was the Schonland Lecture, held early to accommodate the St Andrews College request to co-host this prestigious lecture.

26 October Prof E Baart *"The physics of Music celebrating the Year of Physics"*. Joint RSSA- Albany Museum- ASSAf hosted lecture.

Attendance

All lectures were well attended.

Website

The responsibility for the Website has been assumed by the Young Royals initially for E Cape, but now for entire country (to commence in 2006; Young Royals to report).

THE YOUNG ROYAL SOCIETY

The **Young Royal Society** of the Eastern Cape continues to flourish and aims to promote an interest in scientific activities among the young people of the Eastern Cape through facilitating community engagement, interaction between scientific societies at tertiary institutions, the promotion of science at schools, and arranging lectures and public debates. We are pleased to report an active and successful 18 months.

The YR Society committee, of Lucy Scott (Chairman), Andrew White (Vice-Chairman), Cordelia Leggitt (Secretary), Niall Vine (Treasurer), Martin Villet (RSSA liason), James Barry, Oliver King and Kate Buchner was elected in June 2004. Thirty-five members were registered by 2005.

KWAZULU/NATAL

Unfortunately there was no activity to report on in this Branch during 2005.

NORTHERN AREAS

The Northern Areas branch committee met on 20 May 2005. The Committee, elected for 2 years and approved at the meeting of 2 November 2004, comprised the following members:

Chairman:	Professor Rob Veale
Vice chair:	Professor Bruce Rubidge
Treasurer/Honorary Secretary:	Professor Mary Scholes
Members:	Professors Jo Michael, John Skinner and Rudi van Aarde
Secretary:	Mrs Yolanda Copperthwaite

Professors Rob Veale, Bruce Rubidge and John Skinner represented the Branch on the National Council. Dr Andrea Fuller agreed to join the Branch committee in 2006 since she was on maternity leave.

Four important important functions took place in 2005:

March 17 Professor Frank Nabarro FRS, Hon. FRSSAf was presented with a festschrift to commemorate his contributions to Physics. The festschrift took the form of a special issue of the Transactions of the Royal Society of South Africa, and contained articles contributed by colleagues and associates of Professor Nabarro. The festschrift was presented to Professor Nabarro at a special luncheon hosted by Professor Loyiso Nongxa FRSSAf, the Vice-Chancellor and Principal of the University of the Witwatersrand. Many thanks were extended Professor Jo Michael FRSSAf for his role in the organisation of the event and Professor John Skinner FRSSAf for liaising with Professor George Ellis FRSSAf, Editor of the festschrift, and, as Vice President for his address at the luncheon on behalf of the Society and presenting specially bound copies of the festschrift to Frank.

October 14 Professor Phillip V. Tobias FRS, Hon. FRSSAf was presented with a festschrift to commemorate his 80th birthday, on the day of his birthday. In a special issue of the *Transactions* of the Royal Society of South Africa which contained articles, contributed by colleagues and associates of Professor Tobias', over an impressive range of disciplines including hominid evolution, human genetics and human behaviour and culture. The presentation luncheon was hosted by the President Professor Doug Rawlings FRSSAf who presented specially bound copies of the festschrift to Phillip, and Council of the Royal Society of South Africa and held at the Johannian Club in Johannesburg.

October 14 Dr. Andrea Fuller was awarded the Meiring Naude Medal for her achievements in research. The presentation was made by the President, Professor Doug Rawlings FRSSAf at the Society luncheon for Professor Tobias.

October 20 The Society co-hosted a function at the University of the Witwatersrand, with the University, to commemorate the centenary of the birth of Boris Ivan Balinsky FRSSAf. Balinsky achieved international recognition in Developmental Biology but also across a range of disciplines. Shirley Hanrahan introduced the session and Professor Barry Fabian outlined Balinsky's contribution to science, especially the publication of his famous textbook *Introduction to Embryology* which went to five editions. His daughter Mrs. Helen David provided family reminiscences and the meeting concluded with a lecture by Professor Hazel Sive, an alumnus and currently at the Massachusetts Institute of Technology, Cambridge, USA, entitled *Form from the Formless: the Awesome Power of the Embryo*. There was also an exhibit and slide show depicting events in the course of Boris' life.

WESTERN CAPE

Meetings in the Western Cape were held regularly at the Iziko Museums of Cape Town's SA Museum in Queen Victoria St, with one meeting held in the Kramer Building at UCT's Middle Campus. They were co-hosted by the Academy of Science of South Africa and attendance ranged between 25 and 50. The following lectures were held:

- February 16 *Sharks: Research and Education* - Dr Leonard Compagno FRSSAf, Shark Research Centre, Iziko Museums of Cape Town. (Attendance 37)
- March 31 *Women's Participation in Science* - Professor Cheryl de la Rey, Deputy Vice Chancellor, University of Cape Town. (Attendance 28)
- April 20 *The invisible universe and the SKA* - Professor Justin Jonas, HoD, Dept. Physics & Electronics, Rhodes University and Managing Director, Hartebeesthoek Radio Astronomy Observatory (HartRAO). (Attendance 47).
- May 18 *Extremophiles, the Biological Envelope and Extraterrestrial Life* - Professor Don A. Cowan FRSSAf, Director of the Advanced Research Centre for Applied Microbiology, Department of Biotechnology, University of the Western Cape. (Attendance 41)
- June 22 *Afrotheria, Endemic African Mammals Near The Root Of The Eutherian Evolutionary Tree* - Professor Terry. J. Robinson FRSSAf, Evolutionary Genomics Group, Department of Botany & Zoology, University of Stellenbosch. (Attendance 29)
- August 15 In search of a conservation alternative for African elephants - Professor Rudi van Aarde FRSSAf, Conservation Ecology Research Unit, University of Pretoria. (Attendance 43)
- September 21 *My heart might belong to Big Daddy, but not my DNA* - Associate Professor Jacquie Greenberg, Genetic Counsellor, Division of Human Genetics, UCT Medical School. (Attendance 39)

No lecture was held in October, but an extra one was held in November.

- Nov 12 *Einstein - the Scientist and the Man* - Professor Mike Shara, (American Museum of Natural History, Division of Physical Sciences, Department of Astrophysics . (Kramer Building, UCT - Attendance 32, co-hosted by the ASSAf and SA Institute of Physics)

HONORARY FELLOWS (FOREIGN), FELLOWS (FOREIGN), FELLOWS AND MEMBERS**FELLOWS:**

The Society deeply regrets to report the death of Professor A. C. Brown FRSSAf during 2005. Currently there are 39 Honorary Fellows (Foreign); 2 Honorary Fellows (Northern Branch); 6 Fellows (Foreign) and 197 Fellows; comprising 11 in the Eastern Cape, 18 in Kwazulu/Natal, 24 overseas, 69 in the Northern Branch and 75 in the Western Cape. The following New Fellows were elected during the year:

ELIZABETH JANE CARRUTHERS (Associate Professor, Department of History, University of South Africa)

Jane Carruthers is South Africa's pioneer of environmental history as well as leading authority on the history of nature conservation in South Africa and the effect it has on human populations. Her interest in these two closely related disciplines was apparently initially stimulated by the fact that that bastion of nature conservation, the Kruger National Park, was named after a politician who by virtue of his nurture probably would have had little interest in the conservation of wildlife other than for hunting purposes. Her interest in the Park runs like a golden thread through her publications, culminating in the publication of her doctoral thesis on 'Game Protection in the Transvaal, 1846-1926' as a classic book, *The Kruger National Park: a Social and Political History*. In this and some related publications she objectively and exhaustively analyses the contribution made by Col. James Stevenson-Hamilton to the creation of the erstwhile Sabi Reserve into a National Park by shrewdly exploiting the pro-Kruger sentiments of ministers of the Herzog government – and more specifically Mr Piet Grobler – to name the Park in honour of Kruger, exploding some of the popular political myths held in this country and elsewhere in connection with local nature conservation in the process.

The primary focus of her studies on the environment and conservation is, however, on the heritage aspects of South Africa's landscapes and land, both rural and urban. In this regard she has designed a very successful 'Heritage and History module' in the history department of the University of South Africa (UNISA), where she has been employed for the last 24 years. Her research team established thus facilitates the meaningful analysis of heritage and related social issues, not only for research purposes but also for the service that she and her staff render to communities who are or were dependant on land that is being used or may be destined for use for either conservation purposes or for urban development. Her interest in socio-political issues dates from her student days when she was a committee member of the National Union of South African Students (1964-1966).

She has, for example, been actively involved, as a consultant, to the South African National Parks in land claims affecting them and other historical issues, such as the names used for and within their parks. She was also a member of the research team that wrote the document for the successful proclamation of Mapungubwe as a World Heritage Site. Her involvement furthermore extends to the assistance of NGO's concerned with urban and rural development and to the Land Claims Court's activities regarding claims on urban land in Johannesburg and the Tshwane Metropolitan Council's area, her contributions being on historical heritage aspects.

Jane Carruthers has published the results of her research widely in the form of books or papers, many of which have appeared in refereed journals dealing with her disciplines. The astounding number of 20 quite voluminous books, of which she was either the sole author or a contributor, and 25 articles, in which she was senior or co-author, have been published. She has also delivered 29 significant conference papers and public lectures, 18 of which internationally in England, the USA, Australia and Canada. Her publication on the Jameson Raid was runner up for the 1997 Alan Paton literary award for the best South African non-fiction publication during 1996.

Her scientific productivity and unique mastery of her disciplines have justifiably earned her a high international and national profile. She has been the recipient of five prestigious research fellowships since 1999, one of which has been programmed for this year. The Research School of Social Sciences and Humanities Research Centre of the Australian National University, Canberra have awarded three of these and Cambridge University (Fellow of Clare Hall, Visiting Fellow 2004) and the University of Western Australia (Fred Alexander Fellowship 2000) the other two.

In South Africa she has been awarded and received the UNISA Chancellor's prize for Research in 2004 and she delivered the Chancellor's address at the graduation ceremony of UNISA in 2000. She is a rated National Research Foundation (NRF) scientist, is referee for NRF grant applications and officiates on one of their adjudicating committees.

Jane Carruthers has made an outstanding and unique contribution by critically researching and documenting not only the proud history of environmental conservation, fearlessly exploding some popular myths in the process, but also in the particular emphasis she has placed on the heritage aspects of the land of this country at a time when it is most needed.

STEVEN LOUDON CHOWN (Professor of Zoology & director DST / NRF CoE Invasion Biology, University of Stellenbosch)

Steven Chown has had an exceptional academic career. He graduated B.Sc. cum laude with Zoology and Entomology as major subjects at the University of Pretoria. He followed this with a B.Sc. Honours in Entomology cum laude and registered for the MSc in 1986 which was subsequently upgraded and completed as a Ph.D. in late 1989. Singular achievements have been Young Researcher of the Year in the Faculty of Science, University of Pretoria in 1992, Outstanding Achiever at the same University in 2000-2001, British Association Medal of the South African Association for the Advancement of Science in 1999, IHDP/IGBP/WCRP System for Analysis, Research and Training, Young Scientists Award, 2000 and Rector's Award for Outstanding Research, at the University of Stellenbosch, 2003.

Steven Chown's research has largely concerned an understanding of the responses of species and assemblages to their environments, including responses to changes in those environments through ecological and evolutionary time. His work has been both empirical and theoretical and has been published in a wide range of journals, including *Nature*, *Science*, *PNAS*, *PLoS Biology*, *Proceedings of the Royal Society of London B*, *Trends in Ecology and Evolution*, *American Naturalist*, *Ecology Letters*, *Biological Reviews*, *Ecology*, *Ecological Applications* and *Journal of Experimental Biology*.

Among the major achievements of this work are explorations of biodiversity across the sub-Antarctic at all hierarchical levels, and investigations of how this biodiversity might best be conserved during times of change. This has provided a fresh perspective on the determinants of animal and plant distributions across the region, and has contributed substantially to our understanding of the mechanisms underlying variation in species richness, abundance, and body sizes of organisms. Empirical work on systems and species in southern Africa has complemented the sub-Antarctic research, providing additional insights into the determinants of several macroecological patterns. This work has also led to several widely cited theoretical considerations of the determinants of latitudinal gradients in richness and the mechanisms underlying them.

From an international academic perspective, Steven Chown's achievements have been recognised by his appointment as Executive Editor of *Functional Ecology* by the British Ecological Society, and his invitation to serve as an Associate Editor of both the *American Naturalist* and the open access journal *BMC Ecology*. He also serves on the Editorial Board of the journal *Diversity and Distributions*, and was an Associate Editor of the *Zoological Journal of the Linnean Society* for several years. Professor Chown is currently a scientific advisor to the British Antarctic Survey on their Integrated Programme Review Committee and his international standing was recently emphasised by the South African National Research Foundation with an A-rating, and the award of a DST-NRF Centre of Excellence (the Centre for Invasion Biology). He is on the Board of the South African National Biodiversity Institute and is Chairman of its Biodiversity and Research Committee.

DONALD ARTHUR COWAN (Professor of Microbiology, Dept of Microbiology, University of the Western Cape)

Donald Cowan was born in New Zealand and took his doctorate there in 1980, for a thesis entitled "Thermostable proteases from extremely thermophilic bacteria". Moving to University College, London in 1985, he was promoted to a Readership in 1998. In 2001 he took a Professorship at the University of the Western Cape, where he has led the biotechnology department very successfully since 2002. He was promoted Senior Professor in 2005. He was rated as a B2 researcher by the National Research Foundation in 2002 and there is good ground for believing that the rating will improve in the coming round.

Donald Cowan is a science teacher of remarkable clarity, as was demonstrated by his well-acclaimed lecture on archaea to the Royal Society of South Africa. He is a successful thesis supervisor. He is a regular reviewer of grant applications for the world's leading science funders and of articles submitted to a dozen top journals in his fields, including *Nature*. He is also on the editorial boards on a similar number of international journals. He has founded or consulted for a number of scientific spin off companies and was for four years chair of the United Kingdom Astrobiology panel. He has delivered keynote lectures on six continents and is a regular visitor to the dry valleys of the seventh, Antarctica. Were humans already to have travelled to Mars he would most likely have been among them, looking for his beloved extremophiles. He popularises science in the media consistently. He has excellent collaborations to his credit around the world, not least in China. He holds several patents. He has published ten chapters in good books and ninety articles in peer reviewed journals, including some of the very best.

Donald Cowan has established himself as an excellent scientist, with a wide range of published research in biology to his credit. He is an expert in extremophilic microbiology, whose talents extend also to biocatalysis, genomics, nanotechnology and applications of microbiology in mining and chemical engineering processes.

JILL MARGARET FARRANT (HoD and Professor, Dept of Molecular and Cellular Biology, University of Cape Town)

Jill Farrant is a superb plant physiologist. She initially made her name in analysing the desiccation of desiccation-sensitive (recalcitrant) seeds. She then went on to study seed germination of recalcitrant seeds, carrying out considerable bodies of research on the proteins involved. Later she included studies on

desiccation-tolerant species with a great emphasis on subcellular organization and metabolic activity in seeds that develop different degrees of tolerance to water loss.

She then went on to include studies of the resurrection plant, *Xerophyta humilis*, using metabolic inhibitors to elucidate mechanisms of recovery from desiccation stress. Other resurrection plants she studies include *Myrothamnus flabellifolia* and *X. viscosa*. In the latter, she is an extremely important part of the group including Professors Jennifer Thomson FRSSAf and Sagadevan Mundree, in the development of transgenic plants tolerant to desiccation and other abiotic stresses, contributing her skills in plant physiology to assist students in understanding the changes that occur after the introduction of a foreign gene.

Jill Farrant collaborates widely with scientists both in South Africa and abroad, most notably at the University of Pierre and Marie Curie, Paris and the University of Florence, Italy and has published 77 peer reviewed journal articles and chapters in books. She has graduated seven PhD and 13 MSc students, two with distinction.

ERIC HUGH HARLEY (Emeritus Professor, Department of Chemical Pathology, University of Cape Town)

Eric Harley's broad-based research has been based on the principle that knowledge across a broad field of biology can lead to novel findings in apparently unrelated fields. His early contributions in physical chemistry of nucleic acids, before the field became known as molecular biology, led to investigations of virus structure and function on several viruses. His early cloning experiments (the first in South Africa) on human papovavirus BK revealed the archetypal form of the viral genome enhancer region and that previous studies on papovavirus BK and related viruses had actually been on tissue culture artifacts – with profound implications for control of gene expression in general.

His metabolic work dovetailed with molecular genetic studies on human (and animal) inherited diseases, with novel findings aiding the understanding of inherited diseases of purine and pyrimidine metabolism. With James Davidson he provided fundamental findings on the nature of gap junctional communication between cells, illustrating how experiments of nature give insights into fundamental cell biological processes. Experiments with Don Paglia showing extraordinary anomalies in red cell metabolism in black rhinos, led to resolution of the problem of rhino deaths from haemolytic anaemia and implementation of logical approaches to prevention.

His long-standing interest in Animal and Plant Conservation has biased his research towards molecular systematics and molecular population genetics of southern African animal and plant species in their natural habitats. This has led to important publications on Disas, and many animal species. These basic studies have also facilitated forensic applications.

Eric Harley gave an excellent presentation to the Royal Society in 2004, "Conservation Genetics: how laboratory studies can influence management of African wildlife". He is well known internationally for his work and in particular for the various software programmes he has developed for simulation and analysis of molecular genetic data.

JOHN EDWARD LOWTHER (Professor of Computational Physics, School of Physics, University of the Witwatersrand)

John Lowther has worked in the general area of Theoretical Solid State Physics for over 30 years and has worked extensively on many aspects of Materials Physics. He has received sponsorship and awards from Philips Electronics Company, the Science Research Council (U.K) and from the Royal Society of London for a research fellowship for a sabbatical visit to Kings College in 1999-2000.

John Lowther has also received awards for funding of international collaborations with C.S.I.R (France), University of Darmstadt (Germany), Technical University of Budapest (Hungary) and Uppsala University (Sweden). He has presented invited talks at several eminent institutions, including Universities of Oxford, Newcastle-upon-Tyne, Reading, Bath, Essex, Texas Tech, Technical University of Budapest, Kings College, Darmstadt, Singapore and Strasbourg to name but a few, as well as research organisations such as Plessey Research, Atomic Energy Research Establishment (Harwell), Hellenic Research Foundation (Athens), Philips Research Laboratories (U.K), Trieste (Italy), C.N.R.S (Paris) and Element 6 (South Africa).

His research field includes the role of the Jahn Teller effect influencing properties of the lattice vacancy and defects in diamond, carrier capture mechanisms at defects in semiconductors and crystal field theory as applied to rare earth ions. In the last decade he has mainly worked on computational studies of defects in materials and the predictive modelling of new materials and their synthesis. Materials he has examined include important new advanced nitrides, borides and oxides and combinations of these. He has strong interactions with De Beers / Element 6 here in South Africa in relation to work on diamond and new hard materials and is associated with several patents regarding new hard materials.

John Lowther has published over 130 papers in international journals together with four, invited book chapters. In 2003 he was invited to write a research review on the present status of new super-hard oxide based materials for the prestigious journal "*Materials Research Bulletin*" a journal that is considered to be the mouth-piece for the American Materials Society and the materials community.

He is a regular referee for several highly cited important journals in Physics and Materials including *Physical Review Letters*, *Physical Review*, *Journal of Physics C*, *Solid State Communications*, *J. Phys. Chem. Solids*, *Journal Luminescence*, *Journal Phys. Chem. Solids*, *Journal Materials Science* and the *South African*

Journal of Science. He acts as an N.R.F referee regarding evaluations and awards and is presently member of an N.R.F national advisory panel for funding under the N.R.F. Innovation Programme.

DARRAGH O'DONOGHUE (Astronomer, Head of Instrumentation Division, South African Astronomical Observatory)

Darragh O'Donoghue is internationally highly regarded for his contributions to astronomy over an extraordinary variety of topics ranging from 'pure science' to optical engineering. Following his co-discovery in 1997 of the "EC14026 stars", an entirely new class of variable star, he went on to direct the collaboration, which investigated the new objects. Spurning any suggestion of simply publishing the discovery, he insisted on a detailed investigation of the stars' fundamental properties and thereby maximised the scientific returns from the study.

Darragh O'Donoghue is co-director of the Whole Earth Telescope (WET), a collaboration of 50 astronomers in about 20 countries who make multi-site photometric campaigns to obtain asteroseismological information from rapidly pulsating stars. As such, he takes part in setting policy, providing scientific direction and, in particular, on providing instrumentation advice. WET is the most successful instrument for asteroseismological investigation and is providing significant insight into the structure of many pulsating stars, from white dwarfs to rapidly oscillating Ap stars.

Darragh O'Donoghue has played a major role in the Southern African Large Telescope (SALT). From the start, he has been the South African representative of the SALT Science Working Group and following Bob Stobie's death in 2002, he became a member of the SALT Board. He is the Principal Investigator of SALTICAM, the science verification and first light instrument for SALT. But, critically, he was solely responsible for the optical design of the SALT spherical aberration corrector, which provides a major enhancement of the capability of SALT: providing our telescope with better image quality, a larger entrance pupil size and a larger back focal distance, than its US counterpart.

JOÃO ANTONIO PEREIRA RODRIGUES (Professor of Theoretical Physics, Department of Physics, University of the Witwatersrand)

João Rodrigues is held in high esteem for his personal and scientific qualities. His research output is of the highest standard, which is clearly evidenced by the top quality and impact factors of the research journals where he publishes and by the international recognition and collaboration with leading scientists in his field. Personal contacts with him through collaboration and discussions or attendance at seminars always convinces one of his deep insight related to subjects of his work and beyond. Since he returned to South Africa, he has been the first and only researcher in the topical field of string theory. At the University of the Witwatersrand, he advanced quickly to the ranks of Senior Lecturer and then to a personal Professorship; he is now holding the Chair of Theoretical Physics at the Department of Physics at the University of the Witwatersrand. He has attracted some of the best students for higher degrees and thus has contributed substantially to the dissemination of his special research field.

Internationally, his appreciation by colleagues in Europe and the USA is based on direct collaboration resulting in joined papers and on the publications of the local research team of which he is the leader. By and large, his publications are characterised by a solid mastery of high level technical and mathematical skills. His citations only confirm the considerable impact of his work.

Apart from his appreciable research output, he has been involved in Faculty Administration as Assistant Dean, Student Affairs, a portfolio lying particularly close to his heart. He has been involved in the preparation of some of the Advanced Courses in theoretical physics, in one instance as Chairman. In general terms, João Rodrigues is playing an active role in fostering the aims of theoretical physics in South Africa. He is on the Advisory board of the African Institute for Mathematical Sciences and an active participant of the National Institute of Theoretical Physics, to be established presently.

THEODOR JOHN STEWART (Decision Scientist, Department of Statistical Sciences, University of Cape Town)

Subject expertise in the sciences is of at least two types. The most commonly recognised type involves a detailed mastery and appreciation of a defined area of specialisation that is, in a strict sense, a part of a more encompassing discipline. A less readily recognised manifestation of scholarship lies in the interfaces between disciplines, often informed by an application of philosophical constructs that tease out methodology appropriate across a wide frontier of academic endeavour. This type of scholarship facilitates revision of belief structures.

The focus of the decision sciences is to specify, comprehend and model the primary elements of a given decision situation, and the interactions of those elements. These elements include the decision-makers, the stakeholders, prior knowledge and beliefs, the options available, the range of possible and likely outcomes of decisions, the criteria or objectives which the decisions must meet, and the constraints. The decision scientist seeks to model the situation and structure the decision process in a manner that is facilitative rather than authoritative. The participants are enabled to take explicit control and shape a collective responsibility for the decision process.

It is in this form of scholarship, drawing from powerful mathematical methods, that Theodor Stewart has distinguished himself and achieved international recognition as an innovator and a master of the field. This recognition has culminated in his designation as an A category researcher by the NRF in 2003.

He has over 60 publications in the field, including a major text with Valerie Belton. He has been co-editor of two further monographs published by Springer and Kluwer respectively. He has been actively involved in both the International Federation of Operational Research Societies (IFORS – a broad grouping of over 25000 professionals and researchers worldwide), and the more specialised International Society on Multiple Criteria Decision Making (MCDM) which has some 1400 members.

Within IFORS he is currently Vice President at Large and Chair of the Developing Countries Committee. Previously he had been Programme Chair for the 1996 triennial IFORS meeting, and editor of the proceedings from the 1999 triennial meeting. He is current President of the MCDM Society, and was organiser of the International MCDM Conference held at UCT in 1997.

He has been honoured internationally as Invited Speaker and/or Invited Session Organiser at 10 or more international conferences over the past 10 years, and nationally for his contributions to the discipline and the professional societies.

Theodor Stewart has been President of the South African Statistical Association and of the Operations Research Society of South Africa. He is an elected Fellow of SASA. ORSSA has awarded him the annual Tom Rozwadowski medal on five occasions: four times as author/co-author of the most outstanding SA contribution in any OR journal of a given year, and once, in recognition of outstanding research, academic and professional leadership over twenty years.

Congruent with his role as Chair of the IFORS Developing Countries Committee, Professor Stewart is establishing at UCT a course work MSc in OR and Development, for which he has the two-year collaboration of the leading figure in the discipline. International funding and students are the next challenge, in attempting to use science to serve the interests of the disadvantaged and powerless.

Theodor Stewart has served as a decision consultant on a wide array of national and regional projects covering fields as diverse as the search problems related to the investigation of the Helderberg disaster, electricity generation, water resources planning, hazardous waste management, forestry, fisheries and research project assessment.

PETER VALE (Professor, Nelson Mandela Chair of Politics, Department of Politics, Rhodes University)

Peter Vale currently occupies the Nelson Mandela Chair of Politics at Rhodes University. His previous appointments have been the Director of Research at the SA Institute of International Affairs, Director of the Institute for Social and Economic Research at Rhodes University, Professor of SA Studies and of Social Theory at UWC and Acting Vice-Rector at UWC. He has recently been elected to the Academy of Science of SA.

Peter Vale's research publications include over 40 papers in peer reviewed international journals, 50 book chapters and 10 books. His most recent book "*Security and Politics in South Africa: The Regional Dimension*" has been described by international reviewers as "an outstanding work of critical scholarship", "one of the most important recent works in critical social theory" and "an excellent and original piece of work which will become one of the reference points for discussion about SA external relations".

Peter Vale is undoubtedly one of the leading scholars and researchers in his field both locally and internationally. To substantiate this, the nominees for Peter Vale's Fellowship of the Royal Society invited critical review from three leading peers in the UK, USA and SA. The following are excerpts from their comments on Peter Vale's standing amongst his peers:

"Prof Vale is the best known scholar working in the field of International Relations in SA and is a scholar with a distinguished International research and academic reputation in this field"

"He has a series of first rate journal articles in the best journals"

"In short, Prof Vale is a superior scholar and mentor, widely known and respected internationally"

"He is considered a doyen of Political Science in SA"

"His recent appointment to the editorial board of the European Journal of International Affairs is evidence of his international recognition"

"Peter Vale has made a large contribution in the scholarly canon of International Relations in SA and abroad"

ALBERTUS STEFANUS VAN JAARVELD (Professor of Zoology and Dean, Science Faculty, University of Stellenbosch)

Albert van Jaarsveld has had an outstanding academic career, graduating with a B.Sc., B.Sc. Honours *cum laude* and, after upgrading his MSc, completed the Ph.D. (Zoology) in 1990. He was the winner of a number of scholarships, including a sought after Abe Bailey Travelling Scholarship to visit academic institutions in the United Kingdom and a University of Pretoria Travelling Fellowship to undertake a sabbatical with the renowned endocrinologist Professor Russel Reiter at the University of Texas, USA. In 1995 he was awarded a prestigious Global Security Fellowship, to study at Emmanuel College, University of Cambridge, United Kingdom. While teaching at the University of Pretoria he received awards for excellence as Young Researcher of the Year in 1988, Outstanding Achiever Award for 2000-2002 and Chancellor's Award for Tuition and Learning in 2001.

Albert van Jaarsveld is a versatile research scientist. Initially, his research focussed with success on Endocrinology and Reproductive Physiology and he published in a number of acclaimed scientific journals. Then, following a sabbatical study year with the Commonwealth Scientific and Industrial Research Organisation in Australia, he changed the emphasis to focus in broad terms on aspects relating to

Conservation Planning. Specifically this has dealt with species and environmental surrogacy issues and the effects of climate change and ecosystem services in conservation planning. He has made lesser contributions in the fields of declining populations. His work has appeared in many leading international journals such as *Nature*, *Science*, *Proceedings of the Royal Society of London B* and *Trends in Ecology and Evolution* among others.

The impact of his work has been far reaching. For example, in terms of species surrogacy issues his 1998 *Science* paper has 97 citations and was the subject a commentary piece by Professors Stuart Pimm and John Lawton FRS in the same issue. Likewise, the body of work relating to environmental surrogacy planning (exploring the consequences of environmental or broad scale biodiversity surrogacy in conservation planning and how species patterns are related to vegetation types or other broad land classification schemes) has been cited a total of 111 times to date. In terms of climate change, his primary papers were assimilated into a global co-operative report in *Nature* in 2004 of which he is a co-author. This has accumulated 77 citations in one year, which is quite extraordinary in the field.

From an international academic perspective, Albert Van Jaarsveld's achievements have been recognised in several ways. He was co-ordinator of the Workshop for the World Conservation Union's Red Data Book of the Mammals of South Africa published in 2004. He is on the editorial board of the journal *Biodiversity and Conservation*, was the invited lead-author in the Millennium Ecosystem Assessment Sub-global Working Group Assessment Report, and was on the drafting team responsible for the Millennium Ecosystem assessment Summary Report for Policy Makers. He has served in the review panel of the Global Biodiversity modelling project (Netherlands) and his stature as an international player further enhanced by an invitation to present a keynote address at a Royal Society (London) symposium entitled "Beyond extinction: monitoring wild nature for the 2010 target" (July 2004). In recognition of his international standing he was recently awarded a B1-rating by the South African National Research Foundation.

ALAN KENNETH WHITFIELD (Research & Collections Division Manager / Principal Aquatic Biologist, South African Institute for Aquatic Biodiversity (SAIAB))

Alan Whitfield has established himself as the leading estuarine ecologist in southern Africa. There is no doubt that by unlocking the principles of estuarine ichthyology he has resolved many of the vexing questions that surround the biology of the spectrum of fish that are either permanently resident or make use of the estuary as nursery and feeding areas along the coastline.

Alan Whitfield was a pioneer in the important research field of estuarine ichthyology when he was appointed as a young Research Officer in the newly established Institute of Freshwater Studies at Rhodes University under the Directorship of Professor Brian Allanson FRSSAf in 1979. For many years he worked virtually alone within the Institute, but his enthusiasm for his research field was so infectious that he has become the epicentre from which new studies have expanded and young scientists are recruited and challenged.

From the outset of his research career, he has published the results of his research in the leading international scientific journals in his field. Prior to his work, opinions during the 1970s swirled around the question of how fish use estuaries. Alan Whitfield's quantitative studies of the surf zone in the vicinity of Swartvlei estuary over a 12 month period established unequivocally the role of the surf zone in the feeding of larval fish, the migration of young marine species into the estuary during spring and the clues which bring this about. To any one familiar with the South African coastline this study of the surf zone with calibrated nets at high and low tides irrespective of weather and time of day must stand as a *tour de force*.

This singular contribution has been made by dint of intensely focused study methods and field techniques; and were the genesis of so much of the later innovative thinking and work about fish feeding, sensitivities and evolution. Much of the biology of fish in South African estuaries has been brought together in a bench mark synthesis by Alan Whitfield: *The Biology and Ecology of Fishes in Southern African Estuaries*, published by the J L B Smith Institute of Ichthyology (now the SA Institute for Aquatic Biodiversity) as Ichthyological Monograph Number 2. 1998. More recently (2005), Alan Whitfield's deep understanding of the biology of estuarine fish faunas expands to include the sub-Saharan community in a paper titled "Preliminary documentation and assessment of fish diversity in sub-Saharan estuaries" *African Journal of Marine Science* volume 27. This is a scholarly work that seeks *inter alia* the role the ancient seas played in the distribution of fishes as we see them today. Apart from these benchmark studies, he has published 112 papers in leading international and South African scientific journals.

Alan Whitfield has established himself as an excellent scientist, who regularly publishes the results of his research. He is an expert in estuarine ichthyology, where he has made significant contributions to the advancement of science and inspired many young scientists to take up the challenge.

ANNA-LISE WILLIAMSON (Professor, Principal Specialist Scientist, Institute of Infectious Disease & Molecular Medicine (IIDMM), Faculty of Health Sciences, University of Cape Town)

Anna-Lise Williamson has worked at the forefront of virology in South Africa for many years, starting with work on Jaagsiekte retrovirus at the Onderstepoort Veterinary Institute with the legendary Dr Daan Verwoerd, then moving to the former Dept of Medical Virology at the University of Cape Town in 1987. Since the move to Cape Town, she has initiated work on a novel potential human vaccine vector in the shape of Lumpy skin diseased virus, a host range-limited poxvirus; she has started up the first group in Africa to work

on Human papillomaviruses associated with cervical disease in women and specifically on novel candidate vaccines for the viruses; and she started up the UCT group presently working on HIV-1 subtype vaccines.

Anna-Lisa Williamson has achieved a world reputation for her work on papillomaviruses and has acted as an advisor to the WHO on strategies to combat the viruses. She has produced a significant number of good papers in prominent journals, especially recently, has mentored good Honours, MSc and PhD students, and most significantly, was the prime mover in establishing 5 years ago a "Vaccine Research Group" spanning two campuses of UCT, which since then, has employed 60 odd people – many formerly disadvantaged. She was also recently promoted ad hominem to the rank of full Professor at UCT and the top specialist rank in the National Health Laboratory Services (NHLS). She has very significantly advanced both basic and applied virology in South Africa specifically and Africa in general.

WALTER ZUCCHINI (Professor of Statistics & Director of the Institute for Statistics & Econometrics, Georg-August University, Goettingen, Germany)

Walter Zucchini is Professor of Statistics and Director of the Institute for Statistics and Econometrics at the Georg-August-University, Goettingen, Germany. He took up that position in 1993 having previously been Professor of Statistics at the University of Cape Town. He is a co-author of 3 major research monographs and two undergraduate texts one of which runs to several editions. He has been author or co-author of 67 publications.

Walter Zucchini's research interests run a whole gamut of modelling and model diagnostic issues for real world problems in hydrology, forestry, nature conservation, medicine and finance. He has pioneered model selection methods for rainfall and drought cycles, capture and recapture of wildlife, and height and diameter relationships in trees. Cyclical and circular phenomena, such as bird moult and directions of bird migration, have been the sources of ingenious new models.

Walter Zucchini's interests in time series cover both the world of finance and the phenomena of climate. A crowning achievement has been the development of a web-based South African Rainfall Atlas. This resource, programmed in the freeware R environment, was largely developed at the University of Goettingen, but is an extension of fundamental work during his twelve years of research in the Western Cape.

The Atlas combines advanced statistical computing and excellence of technical work, to achieve appropriate complexity of simulated climate phenomena, and beauty of presentation. The user has free website access through <http://134.76.173.220/rainfall/index.html> to specify a location and obtain a forecast scenario against particular starting conditions. The forecast scenarios draw upon an extensive but patchy historical record. They are achieved through spatial interpolation, and modelling of timing and duration of wet and dry conditions within that record. The underlying daily rainfall model includes 16 parameters. It consists of a discrete part (first order seasonal Markov chain) and a continuous part (continuous distribution with seasonal variation).

Daily rainfall records were collected for 5,070 sites across Southern Africa and were used for fitting and validating the model. In the next step, each of the 16 model parameters was interpolated on a regular grid one minute of degree square throughout Southern Africa, thereby making the parameter estimates available at 424,646 sites. In the next phase the model was used to generate a long (5,000 years) artificial sequence of daily rainfall for each of the 424,646 sites. These sequences were used to compute several empirical statistics of interest, for each site.

The Atlas outputs include maps at various levels of spatial resolution, and simulated numerical rainfall measures for any specified locations. These locations may be selected by latitude and longitude or by graphical crosshairs. The Atlas resource will contribute to insights into regional rainfall with consequences for water management in wet and dry periods. It will assist in planning for water needs and infrastructural consequences in both large urban areas, and more remote places where the rural poor seek livelihoods.

Walter Zucchini served at various times as President of the South African Statistical Association, and as Editor of its journal. He is an elected Fellow of SASA, and Elected Member of the International Statistical Institute.

MEMBERS

The Society regrets to report the death of Professor J Heeg in May 2005. There are 218 members in all: 46 in the Eastern Cape, 28 in KwaZulu/Natal, 45 in the Northern Areas, 82 in the Western Cape and 17 overseas. The following New Members were elected during the year: Eastern Cape: Mrs Helen James, Northern Areas: Ms Christine Steininger (Student); Western Cape: A/Prof LJ Barbour and Ms Widaad Zemanay.

MEDALS

The Meiring Naude Medal for 2005 was awarded to Dr Andrea Fuller, School of Physiology, University of the Witwatersrand.

PUBLICATIONS

In November 2005 the Council of the Society praised the Editor, Professor J D Skinner FRSSAf for his sterling efforts in bringing the publication of the *Transactions* up to the scheduled publication date, so that the journal is published in the correct year. During the year the President worked towards ensuring that the

Transactions would regain its positions on the Thomson ISI index and on the DET's list of approved journals. It is hoped that as a result of reinstatement on the lists, more authors will publish in the journal, so that it can maintain its reputation as one of South Africa's premier multidisciplinary scientific journals. Volume 59 (2) 2004 and 60 (1), 2005 of the *Transactions* were published electronically early in the year. In September, Volume 60(2), a festschrift to Professor Phillip Tobias FRS Hon FRSSAf, was published electronically. Due to very generous sponsorship by Rick and Caroline Menell, Irene Menell; the Claude Leon Foundation and the Palaeo-Anthropology Scientific Trust (PAST), printed copies of this special issue were also made. A commemorative presentation lunch was held at St John's College on Professor Tobias' birthday on 14 October. Following the presentation of special leather bound issues of the festschrift to Professor Tobias and the sponsors, four Northern Branch Fellows were inducted and the Meiring Naude Medal presented to Dr A Fuller.

The Society is indebted to Nico Dippenaar of Isteg Scientific Publications for skilful pre press production of Volume 59 (1), 60 (1) and (2); Sabinet for running the electronic publication of the *Transactions* and to Ultra Digital (Pty) Ltd and Ultra Litho (Pty) Ltd for printing part one of Volume 60. The Editor, with the assistance of the Editorial Board (Dr. C.K. Brain FRSSAf, Prof. G.F.R. Ellis, Prof. D.E. Rawlings FRSSAf and Prof J. Van Staden FRSSAf) continues to evaluate papers received for future volumes.

The Council acknowledges, with great appreciation, the efforts of the Editor to maintain the high standard of the Society's journal and bring the publication of the *Transactions* up to date.

LIBRARY

The Librarian and staff of the University of Cape Town Library continue to catalogue and maintain the Society's Library. About 50 scientific institutions have an exchange agreement, whereby they send publications to the Society on exchange or as gifts.

COOPERATION WITH OTHER BODIES

The Society maintains contact with and has representatives on the following bodies:

- Academy of Science of South Africa (ASSAf) - Professor L R Nassimbeni FRSSAf
- Claud Leon Foundation – Professor D. Rawlings FRSSAf
- Frank Warren Memorial Trust - Professor B. Warner FRSSAf
- National Science & Technology Forum (NSTF), including the Scientific, Engineering & Technological Societies and Allied Professions Group of SA (SETAG) - Professor R. L Christie FRSSAf
- South African Agency for Science and Technology Advancement (SAASTA) - Professor M. N. Bruton FRSSAf

ACKNOWLEDGEMENTS

Grateful acknowledgement is made of the valuable assistance rendered by Elaine Rutherford-Jones in the running of the national office of the Society. (She wanted to move on, left in May and was replaced by Susan Dymond. Susan however, found the work did not suit her and resigned before the end of July. Fortunately, at that time Elaine was still in a position to be able to return to the post and remained until the year end when fresh interviews for the post were conducted) We wish to thank the chairs and committee members of the branches of the Society, some of whom were very active during 2005. We wish the new chairmen of the Branch committees well for the New Year. Thanks also to organisers of lectures, the speakers and those who delivered votes of thanks at lectures, as well as to the Iziko Museums of Cape Town and UCT for hosting the public meetings. The Society is also very grateful to the South African Astronomical Observatory for lending the boardroom for Council meetings. We would also like to thank the Dean and staff in the Science Faculty Office at UCT, for kindly accommodating the national office and for sharing faxing and photocopying facilities.

R. L. CHRISTIE
GENERAL SECRETARY