



Royal Society of South Africa Newsletter July 2024

PROMOTING SCIENCE - RECOGNIZING EXCELLENCE IN RESEARCH AND SCHOLARSHIP

News from Fellows and Members of the RSSAf: Awards and Accolades



We are delighted to share the news that **Professor Dudley E. Shallcross (FRSSAf)** has been awarded an OBE in the King's birthday honours in 2024 for his many and varied contributions to science education in the UK and worldwide. Dudley has been an academic at the School of Chemistry at Bristol University since 1999 and an extraordinary Professor at the Department of Chemistry at the University of the Western Cape in South Africa since 2018.

In addition, Dudley was a Director of the Bristol ChemlabS Centre for Excellence in Teaching and Learning (2005-2010); CEO of the Primary Science Teaching Trust (2010-2022), President of the Education Community of the Royal Society of Chemistry (2020-2023) and most recently is Chair of the Enthuse Charitable Trust since 2023. He has won several awards, being the first National Teaching Fellow in Chemistry (2004), the Nyholm Prize for Education from the Royal Society of Chemistry (2017); the George C. Pimentel Award for Education in Chemistry from the American Chemical Society (2020), both being their highest Education awards and was in the inaugural Education Award from the Society of Chemical Industries in 2006. Dudley's contributions to primary, secondary and tertiary education, promotion of science to a wide range of audiences and working with those with disadvantage or disability are well known.

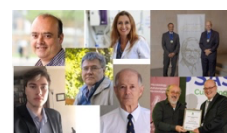
Professor Valerie Mizrahi (FRSSAf), Director of the Molecular Mycobacteriology Research Unit, University of Cape Town, has been recognised for her contribution towards science with a prestigious lifetime fellow honour from the American Association for the Advancement of Science (AAAS). For more details, please follow the link: [UCT academic receives distinguished AAAS fellow lifetime honour | Institute of Infectious Disease and Molecular Medicine](#).



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News from Fellows and Members of the RSSAf: Awards and Accolades



Prof. Shabir Madhi (left) and Prof. Keith Klugman (right) at the 31st Albert B. Sabin Gold Medal Ceremony held at the National Academy of Sciences building, Washington, D.C.

On 18 April 2024, The Sabin Vaccine Institute presented the Albert B. Sabin Gold Medal to **Prof. Keith Klugman (FRSSAf)** and **Prof. Shabir Madhi (FRSSAf)** in recognition of their contribution to the field of vaccine development. The Gold Medal is awarded to members of the global health community who distinguished themselves through exceptional contributions to vaccinology or related field and is considered one of the highest honours in the field.

For the article covering this great achievement, please follow the link: [Vaccinologists Keith Klugman and Shabir Madhi Awarded Sabin's Prestigious Gold Medal; Infectious Diseases Epidemiologist Nicole Basta Receives Rising Star Award – Sabin Vaccine Institute](#)

In addition, Prof. Klugman received an Honorary Doctorate in Medicine from the University of the Witwatersrand and was invited to give the address to the graduating medical class in November 2023.

Professor Guy Midgley (FRSSAf), Distinguished Professor in the Department of Botany and Zoology, Stellenbosch University, was recently honoured with the 'Ecology and Evolution Leader Award', 2024. According to Research.com, he is currently ranked at 482 in the world, and 5th in South Africa in the field of Ecology and Evolution. He recently featured on SABC news (e.g., <https://www.youtube.com/watch?v=vCizlI4hBVc>), and Newzroom Afrika (e.g., <https://www.youtube.com/watch?v=L23hJLAXkRY>), highlighting critical aspects related to climate change.



In April 2024, **Professor Miles Markus** (University of the Witwatersrand), **FRSSAf**, received a Lifetime Achievement Award from the WITS Research Institute for Malaria (WRIM). Prof. Markus' contribution to the field was acknowledged at the WRIM Research Day held at the WITS Faculty of Health Sciences, where he gave the award presentation titled 'Hidden parasites in malaria'. This is the latest award received by Prof. Markus with his contribution to the field previously being acknowledged in 2023 when he was awarded the Elsdon-Dew Medal of the Parasitological Society of Southern Africa, their highest honour ([Parasitological Society of Southern Africa \(PARSA Annual Medals\)](#)).

News from Fellows and Members of the RSSAf: Awards and Accolades



Professor Leon Dicks (left) receiving the SASM Gold Medal award in recognition of his contribution to the field of Microbiology. The award was presented by Dr Heinrich Volschenk (right), President of SASM.

Professor Leon Dicks, FRSSAf, was awarded the prestigious South African Society for Microbiology (SASM) Gold Medal in 2023 for his exceptional achievements and contributions to the field of Microbiology. Prof. Dicks is currently a Distinguished Professor in the Department of Microbiology, Stellenbosch University, where, over a period of 38 years, established a productive research team focusing on the molecular taxonomy of lactic acid bacteria and the characterisation of antimicrobial compounds (including bacteriocins) produced by lactic acid bacteria. This latest award is one of several prestigious awards received in the past, with his research excellence also reflected in high quality scientific papers, book chapters, patents, and postgraduate students graduated. His academic achievements culminated in a DSc (Microbiology) in 2023 from Stellenbosch University on “Interactions between gut microbiota and the central nervous system, with emphasis on quorum sensing between commensal lactic acid bacteria and human cells”.

Oguzhan Yer, MRSSAf, received the Kazim Berzeg Award in February 2024 for winning an essay contest hosted by the Association for Liberal Thinking (ALT). The award was for the paper titled "Postmodern Bir Hades Olarak Friedrich von Hayek: Yer Üstü Kolektif Şiddetine Karşı Olmak" which can be translated as "Friedrich von Hayek as a Postmodern Hades: Being Against the Collective Violence". The paper was on the topics of freedom, peace and pluralism. Oguzhan is currently a student at Parma University and the Middle East Technical University. He has been accepted as an independent scholar to the Bodleian Libraries (2022), and has a keen interest in theoretical physics, with a focus on hypothesis H, as well as standard model and quantum field theories.



News from Fellows and Members of the RSSAf

Congratulations

Professor Ntobeko Ntusi FRSSAf, the chair and head of the Department of Medicine at the University of Cape Town (UCT) and Groote Schuur Hospital (GSH), assumes the role of president and CEO of the South African Medical Research Council (SAMRC) from July. He bid farewell to UCT and GSH on Wednesday, 22 May, in what was a maiden valedictory lecture for UCT. <https://www.news.uct.ac.za/article/-2024-05-28-ntobeko-ntusi-delivers-valedictory-address?>

Story Rebecca Crowie. **Photo** Robyn Walker



News from Fellows and Members of the RSSAf

HERITAGE SITES CELEBRATED AT TOPPIESHOEK

Overlooking Hartbeespoort Dam is a 60ha property named Toppieshoek that currently belongs to the Tshwane University of Technology (TUT). Over the past year **Vincent Carruthers, MRSSAf**, and **Jane Carruthers, FRSSAf**, have been working through the Magaliesberg Association for Culture and Heritage (MACH) to collaborate with TUT on the conservation of two important heritage sites on the property. These are very different from one another: one is the historically important archaeological remains of an Early Iron Age farming settlement named Broederstroom, dating from 350 AD, while the other is the Leiden University Observatory’s old Southern Station that operated from 1953 to 1978.

Three Blue Plaques – the international symbols of a heritage site – were unveiled on Toppieshoek on 9 March 2024 in a splendid celebration to mark the Toppieshoek Restoration Project. More than 120 people attended the event, including the Vice-Chancellor and Principal of TUT, Prof Tinyiko Maluleke who unveiled the plaques, Ms Kenetswe Mosenogi, the North-West MEC for Arts, Culture and Recreation, Jessica Glendinning, Policy Officer: Culture and Media of the Embassy of the Kingdom of the Netherlands, as well as numerous other dignitaries from the University and public life.

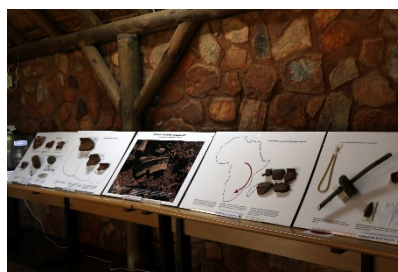


Unveiling the Blue Plaque and information boards for the Broederstroom Archaeological Site on 9 March 2024. L-R: Alec Jamieson; Vincent Carruthers; MEC Kenetswe Mosenogi; Jane Carruthers; Prof. Tinyiko Maluleke, Principal and Vice-Chancellor of TUT. (Photograph: Sally Gaule)



The Tshwane University student choir enlivened the proceedings. (Photograph: Sally Gaule)

The archaeological site was discovered by Arnout van Genderen, one of the Dutch astronomers working at Toppieshoek in the early 1970s. He discussed his find with WITS archaeologist Revil Mason who immediately appreciated its age and importance, and his excavations changed our knowledge of the earliest Black communities in southern Africa. When light pollution in Johannesburg compromised astronomical observations in the city in the 1950s, astronomers from the Leiden University Observatory arranged to move out from the Republic Observatory to Toppieshoek. There, important discoveries contributed to the growing knowledge of the universe, particularly from the study of variable stars. When the Observatory at Toppieshoek was closed 25 years later, two historic telescopes, the Franklin-Adams telescope and the Rockefeller Twin Astrograph, remained on the site, still housed in their original observatory buildings.

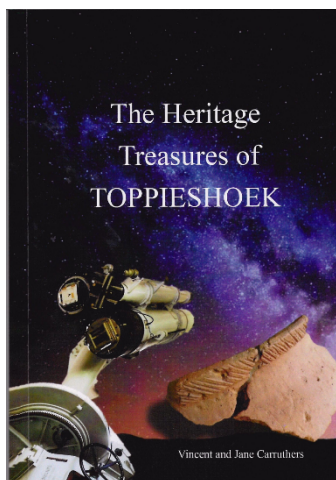


The archaeological exhibition on display at the opening of the Toppieshoek Restoration Project and Blue Plaque unveiling. (Photograph: Sally Gaule)



The Franklin-Adams telescope on Toppieshoek. (Photograph: Vincent Carruthers)

News from Fellows and Members of the RSSAf



The collaborative project between MACH and TUT has resulted in a signed Memorandum of Understanding between MACH and TUT. MACH has erected six information boards at the site giving details of the archaeological and astronomical heritage and a report detailing recommendations for future curation, restoration, and use by TUT has been presented to TUT management. A comprehensive bibliography of literature relating to both sites has been compiled and a booklet entitled *The Heritage Treasures of Toppieshoek* has been published and is available from MACH through Mike Benn mike.2sparrows@gmail.com at a cost of R100 plus postage.

News Note: Book available for free download

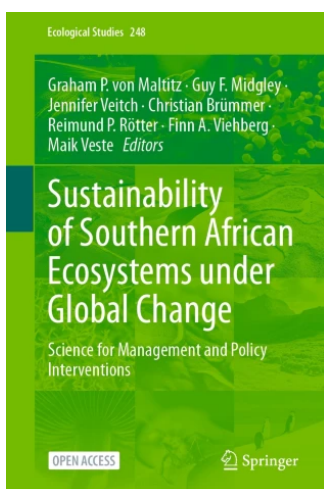
To encourage interest in the history of the Royal Observatory, Cape of Good Hope (now part of the SAAO), **Ian Glass, FRSSAf**, and the centre for Astronomical Heritage have made it available to read online or to download, free of charge.

Please see the following link: <https://cfah.org.za/resources/rocgh-glass/>



The Royal Observatory at the Cape of Good Hope
History and Heritage

I. S. Glass



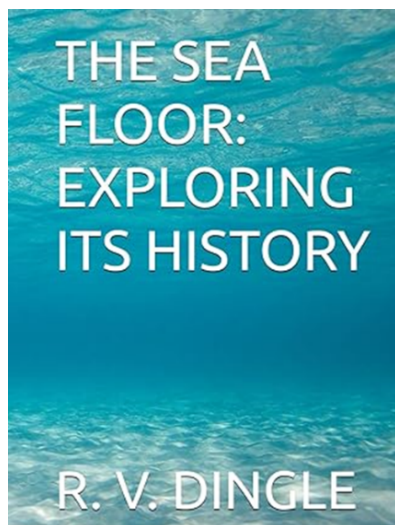
This open access book about the sustainability of marine and terrestrial ecosystems in southern Africa provides a synthesis of the research program Science Partnerships for the Adaptation to Complex Earth System Processes (SPACES II, 2018-2022). It addresses the scientific, social, and economic issues related to climate change, its potential impacts on the various ecosystems, adaptations, and management interventions for enhancing systems resilience in Southern Africa. It is written by numerous scientists from African states and Germany and summarizes the latest research findings, which are of great relevance for a better understanding of climate change impacts, adaptations, and vulnerabilities as well as for developing management options and policy options to reduce the associated risks.

For more information, follow the link:

<https://link.springer.com/book/10.1007/978-3-031-10948-5>

Editors: Graham P. von Maltitz, **Guy F. Midgley (FRSSAf)**, Jennifer Veitch, Christian Brümmer, Reimund P. Rötter, Finn A. Viehberg, Maik Veste

News from Fellows and Members of the RSSAf



THE SEA FLOOR: EXPLORING ITS HISTORY Paperback – 26 April 2024

by [R. V. DINGLE](#) (Author; **FRSSAf**)

This is an autobiographical account of a sixty-year career in marine geoscience and micropalaeontology; topics which I combined to help understand the evolution of the sea floor.

It plots the course I followed from my undergraduate days in the 1960s through my retirement, to 2024. My career includes the short, exciting transition in the late 60s to early 70s, when earth science teaching and notions passed from the 19th century dogmas of uniformitarianism and crustal stasis, via the period of “earth science enlightenment” with the acceptance of seafloor spreading, to the modern expansive attitudes engendered by plate-tectonics and palaeogeographies.

I have seen and experienced enormous changes in the technology of sea-floor exploration, which had its own renaissance with the advent of digitisation in data-collection and management, and navigational techniques. Similar changes have been slower in micropalaeontology, where taxonomy is still critical, but concepts of ocean-basin evolution have necessitated radical rethinking of global palaeobiological developments.

The book is a personal journey of exploration from a time when marine geology was a fringe academic activity in the North Sea (before commercial hydrocarbon exploration had begun), to twenty years of geological and geophysical mapping the unknown fringes of the SE Atlantic/SW Indian, and the Southern oceans. Simultaneously, I undertook sample collecting on land in southern Africa, New Zealand, and Antarctica. My final contributions have been cogitating the development of global deep-sea benthic micro-crustacean faunas on which I specialised, viz, Ostracoda.

Physically, the journey took my studies from Hull, to Cape Town, to Aberdeen, to Cambridge (BAS), to Copenhagen, and finally to the Natural History Museum in London. During this time, I was a full professor at Cape Town and Copenhagen.

It is also a record of communal endeavour (going to sea is not a solo operation), and my interactions with some interesting and charismatic personalities.

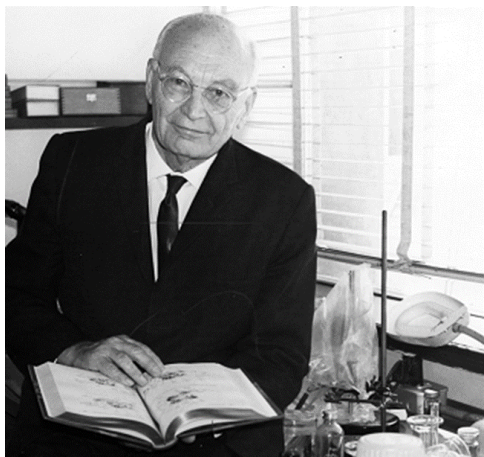
Oguzhan Yer, MRSSAf, highlighted the fact that 2025 is the 100th year of the formulation of quantum mechanics and has been declared as the international year of quantum science and technology (<https://quantum2025.org/>) by the United Nations. Since formulation in 1925, quantum mechanics have been seen as “the brain” of physics which is compulsory to propose what’s happening at the small scale which are responsible for the building blocks for creating the cosmos.

Request:

‘I suggest to the Royal Society to organise an event or event series for such an important date to discuss and share latest developments in theoretical and experimental physics to stretch the horizon of reflections on quantum mechanics, gravity and unified field theory’.

News from Fellows and Members of the RSSAf

BALINSKY SYMPOSIUM 10-11 April 2024 СИМПОЗИУМ БАЛІНСЬКОГО



Boris Ivan Balinsky 1905-1997.

Boris Ivan Balinsky (1905-1997) was elected a Fellow of the Royal Society of South Africa in 1961. He was a world-renowned scientist who joined Wits in 1949, became Head of the Department of Zoology in 1954, and Dean of the Faculty of Science from 1965-1967. Known as 'B.I.', Professor Balinsky was an experimental embryologist and outstanding lecturer who energised zoological research at Wits, introducing electron microscopy to biology, and initiating cutting-edge projects on evolutionary biology, amphibian breeding, and developmental studies. His former lab is now named after him, and several student prizes bear his name. He was the author of *Introduction to Embryology* (1960) a classic textbook that ran into many editions and was translated into several languages. It is therefore not surprising that Wits greatly values the contributions of this scientist and that his legacy is remembered.

Balinsky's reputation and achievements are not South Africa's alone. A keen naturalist throughout his life, he was born in Kiev and his career there spanned the Russian Empire, the Bolshevik Revolution, the Stalinist 1930s, and the Second World War. These were extremely difficult years for Balinsky, and towards the end of the war, he fled to Poland, thence to Germany, and eventually to Scotland, before emigrating to South Africa. In his early years, he worked with outstanding Ukrainian scientists at Kiev University (where he was full professor) and the Ukrainian Academy of Sciences (as deputy director). During these years he performed some ground-breaking research in cell transplantation in salamanders.

Thus Ukraine, too, honours Boris Balinsky and after delays created by the Covid-19 pandemic and the war in Ukraine, a long-anticipated symposium to honour the man and his legacy was held at Wits on 10-11 April 2024 as part of Wits centenary celebrations. The event was organised jointly by Wits and the Embassy of Ukraine with the participation of many leading scientific institutions in Ukraine. The hybrid symposium was chaired by Prof. Neville Pillay, Head of the School of Animal, Plant and Environmental Sciences, and was attended by Vice-Chancellor Prof. Zeblon Vilakazi, Prof. Nithaya Chetty the Dean of Science, and other Wits senior staff. Also present were the Ukrainian Ambassador H.E. Ms Liubov Abravitova and Ms Dzvinka Kachur of the Ukrainian Association of South Africa. Papers were presented by numerous local and international scientists, including a strong cohort of Ukrainians, all of whom were either working in Balinsky's field or greatly influenced by his work. It was particularly pleasing to have Balinsky's daughter, Mrs Helen David (also a Wits graduate), give her perspective on Boris Balinsky as father, naturalist, and artist.



Mrs Helen David, Professor Zeblon Vilakazi, and Ukrainian Ambassador, H.E. Ms Liubov Abravitova.

See: <https://www.wits.ac.za/news/latest-news/general-news/2024/2024-04/symposium-held-to-honour-professor-boris-balinsky-.html>

Jane Carruthers, FRSSAf

News from Fellows and Members of the RSSAf



Prof. Don Cowan at the opening session of FMG2024. Photo provided by Carla de Jager, Carlamani Conference Organising Company.

The 6th International Conference on Functional Metagenomics (<https://fmg2024.carlamani.com>) was held 2-5 June 2024 at the Kruger National Park, Skukuza, South Africa. The conference was hosted by **Professor Don Cowan, FRSSAf** and previous President of the RSSAf. The conference brought together researchers from across the globe, focusing on new technologies and approaches in gene discovery through metagenome-derived gene expression platforms. It was also highlighted how this field has changed over the past two decades, leading to a final discussion as to the future of functional metagenomics.

The conference was sponsored by *Applied Microbiology International*, *Inqaba biotec™*, *(GIGA)ⁿ SCIENCE*, and South African Tourism (www.southafrica.net).



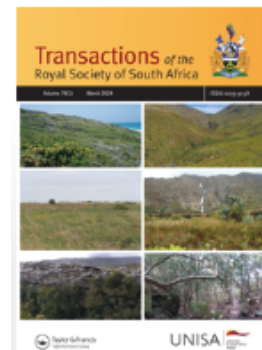
Attendees of FMG2024, Skukuza, 2-5 June 2024. Speakers included **Professor Stephanie Burton, FRSSAf** and previous President of RSSAf (Invited Speaker), **Professor Marla Trindade, MRSSAf** (Keynote Speaker), and **Associate Professor Marilize Le Roes-Hill, MRSSAf** (Speaker). Photos provided by Carla de Jager, Carlamani Conference Organising Company.

Transactions of the Royal Society of South Africa: Editor's Notes

The latest edition of the *Transactions of the Royal Society of South Africa* is available ([Transactions of the Royal Society of South Africa, Volume 79, Issue 1, June 2024](#)). Please note that access to the journal is free to all Fellows and Members of the RSSAf.

The Editor also welcomes any thoughts/suggestions, ideas for special issues, and opportunities for us to advertise the journal more widely and improve the offerings. **Please email the Editor directly: hillt@ukzn.ac.za**

Trevor Hill, FRSSAf
Editor-in-Chief
Transactions of the Royal Society of SA



General Announcements

The University of Cape Town has invited Joachim Frank to Cape Town from 15-21 August 2024. Joachim is the inventor of the method of image classification that has led to the “resolution revolution” in cryogenic electron microscopy (cryo-EM), a major driver of innovation in medicine, biotechnology, and agriculture. While the developed nations invest heavily in this cutting-edge technique, it remains nearly absent in Africa. Cryo-EM is rapidly replacing X-ray crystallography as the preferred method for determining the atomic structures of biological molecules, offering greater versatility and eliminating the need for crystals. In 2017, Joachim shared the Wiley Prize in Biomedical Sciences with Richard Henderson and Marin van Heel. Later in the same year he was awarded the Nobel Prize in Chemistry together with Richard Henderson and Jacques Dubochet. He has contributed significantly to our understanding of the mechanism of the ribosome and its transport across biological membranes.

He is an important innovator in the field and is currently developing techniques for time-resolved cryo-EM – making atomic-resolution movies of life processes.

AFRICAN RESEARCH SOCIETY INVITES YOU TO OUR THIRD ANNUAL

INSIDE THE RESEARCHER'S MINDSET CONGRESS

joining us in-person

Prof Joachim Frank
NOBEL PRIZE IN CHEMISTRY 2017
Professor of Biochemistry and Molecular Biophysics and of
Biological Sciences at Columbia University

Cape Town, South Africa

17-20 August 2024

MEET OUR SPEAKER >>

MEET OUR SPEAKER

Prof Joachim Frank

The Nobel Prize in Chemistry 2017 was awarded jointly to Joachim Frank, Jacques Dubochet, and Richard Henderson “for developing cryo-electron microscopy (cryo-EM) for the high-resolution structure determination of biomolecules in solution”

Cryo-EM has become a powerful tool that is applied in a wide range of research areas, such as microbiology, neurobiology, immunology, cell biology, developmental biology and molecular biology.

CONGRESS PROGRAMME >>

General Announcements



CONGRESS PROGRAMME

Saturday, 17 August 2024
 **Inside the Researcher's Mindset**
 Delve into Prof. Frank's research career and life journey

Monday, 19 August 2024
 **Innovation Workshop**
 The role of Cryo-EM in discovering new drugs and vaccines

Tuesday, 20 August 2024
 **Vice Chancellor's Open Lecture**
 Cryo-EM: A New Foundation for Molecular Medicine & Drug Design

**MORE INFORMATION TO FOLLOW
WATCH THIS SPACE**

<https://neuroscience.uct.ac.za/events/inside-researchers-mindset-2024-nobel-laureate-uct>

-
- Saturday 17 Aug (6pm-7pm):** "Inside the Researcher's Mindset" arranged by African Research Society – Yanelisa Pulani
 RSVP https://docs.google.com/forms/d/1ttEQmhSmCHOUSJu5lfj3pLj2JjgUa2GC6s_kqOUT1A/viewform?ts=6660161b&edit_requested=true
-
- Sunday 18 Aug (5pm – 7pm):** Social Event in the Foyer of the New Engineering Building, UCT (near the EM Unit) Finger supper and wine will be served.
 RSVP <https://uctcmc.eventsair.com/idm-social-event/social-event-rsvp-form>
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- Monday 19 Aug (9am – 5pm):** All day workshop at the Institute for Infectious Diseases and Molecular Medicine, Wolfson Theatre, UCT: “The role of CryoEM in discovering new drugs and vaccines” – will be broadcast on Zoom to a national audience. Aimed at scientists
 RSVP <https://uctcmc.eventsair.com/workshop---the-role-of-cryoem-in-discovering-new-drugs-and-vaccines/rsvp-form>
-
- Tuesday 20 Aug (6pm-7pm):** VC's lecture “Cryo-electron microscopy, a new foundation for molecular medicine and drug design” aimed at the general public

You are invited to participate in the events above. Please indicate your interest by completing the web-based reply forms. Further information will be available soon.

General Announcements



You are invited to contribute to the

CHARLES DARWIN MEMORIAL FUND

that will make it possible for a bronze bust of a young Charles Darwin to be displayed on Simon's Town Jetty in Simon's Town.

The institutional home for the project is the Geological Society of South Africa, which has provided a ring-fenced bank account and will administer the donated funds. The project also has the support of the Cape Town Heritage Foundation, Overberg Geosciences Group and the Simon's Town Historical Society. A subcommittee has been formed to oversee the long-term maintenance and use of the Darwin statue.

Donations should be deposited into Standard Bank account number 022 721 444 GSSA-DPP at the Eloff Street branch of Standard Bank, Johannesburg, branch code 051 001, with the name and email address of the donor and the reference 'Darwin'. **Please donate generously.** All donations will be acknowledged. Donors will be updated on the progress of the fund-raising campaign and will be invited to the unveiling ceremony.

Motivation for the mounting of a bust of Charles Darwin in Simon's Town

Charles Darwin's 19-day visit to the Cape of Good Hope in May/June 1836 during the five-year voyage of *HMS Beagle* was the first opportunity he had to discuss his embryonic ideas on evolution with knowledgeable, English-speaking scientists. In particular, his discussions with the astronomer/natural philosopher, Sir John Herschel, in the Cape were crucially important to the development of his ground-breaking Theory of Evolution by Natural Selection.

Darwin had a thorough understanding of geology when he embarked on the five-year voyage of *HMS Beagle* in December 1831. During the voyage he collected vast amounts of data as well as fossils and plant and animal specimens that allowed him to eventually develop his Theory of Evolution.

His insights into geology made him realize that, contrary to contemporary teaching, the Earth is much older than previously thought and that its crust is constantly changing through the physical forces that are still active today. He realized that, if the physical environment is changing, plants and animals would also need to change in order to be well adapted, thrive, breed, and pass their genes on to the next generation.

Darwin's discussions with Herschel on this 'Mystery of mysteries' enabled him to crystallize his ideas. He also took Herschel's advice that he should use his data not only for descriptive purposes but also to propose and test a 'big idea'. Darwin shaped the rest of his career around the wise advice that Herschel gave him in the Cape.

The bust of Charles Darwin, which depicts the 27-year-old naturalist as he looked in June 1836, in the sculptural style of the 1830s, will commemorate the important role that his visit to the Cape of Good Hope played in the development of one of the most influential theories in the history of science.

We look forward to your support of this important project.

Dr Craig Smith, Executive Manager
Geological Society of South Africa
info@gssa.org.za
Hout Bay, Cape Town
083 262 2604

Professor Mike Bruton (FRSSAf)
Project Manager, Cape Town
mikefishesbruton@gmail.com
083 212 7609

General Announcements

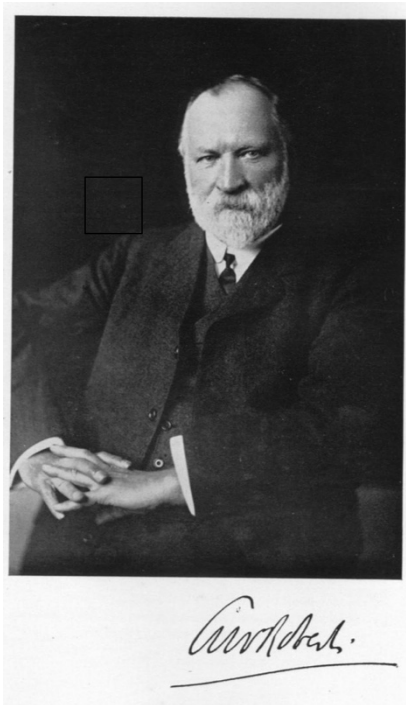
DARWIN BUST PROJECT

Additional notes on Charles Darwin for geoscientists – by Mike Bruton

1. Charles Darwin was more of a geologist than a biologist when he embarked on the voyage of *HMS Beagle* in December 1831. Despite the fact that he formulated the greatest theory in the history of biology, he is more often referred to as a geologist in modern writing.
2. Although he had made hobbyist collections of plants and animals (as well as rocks, minerals and fossils) as a student, the only scientific expedition that Darwin had participated in prior to the voyage of *Beagle* was a survey of the geology of Wales with Adam Sedgwick, Professor of Geology at Cambridge University. Sedgwick was one of the founders of modern geology who proposed the Cambrian, Devonian and Silurian periods of the geological timescale (the latter two with Roderick Murchison).
3. Robert Fitzroy, captain of *HMS Beagle*, presented Darwin with a copy of the first edition of Charles Lyell's ground-breaking book, 'Principles of Geology', at the beginning of the voyage. Darwin studied the book throughout the long journey and made many observations on volcanoes, earthquakes, tsunamis, soil erosion and sedimentation and other geological phenomena that supported Lyell's Theory of Uniformitarianism. He probably collected more data in support of Lyell's theory than Lyell had done himself!
4. Darwin even refuted some of Lyell's findings. For instance, he proved that atolls are formed by the upward growth of coral reefs and not by subsidence, as Lyell had proposed. After Darwin returned to London, he and Lyell became firm friends and Lyell supported him throughout his long career.
5. One comment that Lyell made in his book that particularly caught Darwin's attention was his observation that, if the physical environment is constantly changing, then plants and animals would also need to change in order to remain adapted.
6. Darwin's knowledge of geology put him at a distinct advantage over other early evolutionists, such as Georges Cuvier, Jean Baptiste Lamarck and Richard Owen, who only had knowledge of palaeontology.
7. During his extensive expeditions into the interior of Brazil and Argentina, Darwin made copious notes on geology and, in his 'Journal of Researches into the Natural History and Geology of the Countries Visited ...' he provided in-depth analyses of the geology and geomorphology of these countries, on which he subsequently published a book.
8. By the time he had reached the Galapagos islands on the voyage of *HMS Beagle* Darwin was convinced that the Earth must be much older than the biblical claims and that the structure of the Earth's crust is subject to constant changes. The one outstanding piece in the evolutionary puzzle was: what is the mechanism for plants and animals to change in response to these environmental changes?
9. Darwin later wrote, "If it wasn't for the 'Principles', there would have been no 'Origin'", meaning that, if it had not been for Lyell's book 'Principles of Geology', he would not have been able to write 'On the Origin of Species'.
10. While Darwin was in the Cape Colony Dr Andrew Smith, Curator of the newly established South African Museum in Cape Town, showed him the Sea Point Contact. Although Darwin did not discover this important geological site (it had been found by Clark Abel in 1818), his writing about the contact zone between the Malmesbury Group and the intrusive Cape Granite was an important turning point in the debate between the Plutonists and the Neptunists about the origins of granite.
11. While visiting the Cape Colony Darwin also undertook a five-day horseback trek with a Khoi groom from Cape Town to Paarl, Franschhoek, Houwhoek and back to Cape Town, during which he made extensive geological observations and collections.
12. Back in London Darwin first wrote up his geological findings before writing up his zoological and botanical discoveries.
13. Darwin was never employed by a government research institute, university or museum, and also steered clear of appointments with scientific societies. The only such appointment he ever held was as Secretary of the Geological Society of London. Darwin was subsequently elected as a Fellow of the Geological Society of London.
14. Darwin died in 1882 and was granted a full state funeral which was attended by thousands of people, both supporters and detractors. He is buried in Scientists' Corner in Westminster Abbey next to Sir John Herschel and near Sir Isaac Newton. Stephen Hawking was recently laid to rest next to Darwin. Darwin was never knighted due to objections from the Church of England, which has subsequently apologized for its action.

Historical Note

Pioneer Variable-Star Observer: Alexander William Roberts (1857-1938)



In the early years of the twentieth century three Scotsmen – David Gill, Robert Innes, and Alex Roberts – were luminaries of South African astronomy. Two of them led major research establishments: Gill as H.M. Astronomer directing the Royal Observatory, Cape of Good Hope, and Innes as Union Astronomer in charge of the Union Observatory, Johannesburg. Roberts, in contrast, did not leave his mark as an institutional leader; in fact, he never held a professional scientific position. He operated instead as an independent researcher at the crossroads between the informal realm of amateur enthusiasts and the increasingly dominant world of professional scientists. An extraordinary work ethic combined with pathbreaking insights on eclipsing binary stars earned Roberts the respect of European and American astronomers, many of whom were surprised by the contributions of such an isolated, unaffiliated investigator.

Born near the northernmost extremity of Great Britain at Farr, Scotland, Roberts was of humble crofter origin. His parents moved the family to Leith, the port of Edinburgh, where he received his education at St. James Schools and Moray House. He aspired to a scientific career but trained as a schoolteacher. In 1883 Roberts accepted a call from the Free Church of Scotland to teach at the Lovedale Missionary Institution near Alice in the Eastern Cape. The clear starry skies of Southern Africa came as a revelation to him. Roberts began corresponding with established astronomers. David Gill at the Cape and Edward Pickering of Harvard encouraged him to keep an eye out for stars that varied in brightness from night to night.

That he did. Roberts was to become the most prolific and exacting variable star observer in the southern hemisphere at the turn of the century. By 1920 he had made roughly 70,000 estimates of the brightness of stars. His methods and record-keeping were meticulous. He identified scores of variable stars, many of which varied in brightness because they were eclipsing binary stars. On account of the precision of the light curves he derived from thousands of observations, Roberts was able to compute the orbital elements, masses, and densities of stars in several binary systems. It is noteworthy that his analysis of binaries was on par with that of contemporaries Henry Norris Russell and Harlow Shapley at Princeton University. Jan Smuts would later write admiringly, “After Roberts let no amateur despair.” But Roberts was no mere amateur; professional outlets such as the *Astrophysical Journal* and the *Monthly Notices of the Royal Astronomical Society* published his research.

His day job, of course, was that of a schoolteacher. In 1893 he took over supervision of Lovedale’s Normal Department. Over this instructional career Roberts was responsible for the training of nearly 4,000 African schoolteachers, and through the extensive contacts that ensued he became progressively conversant in the racial politics of South African education. In 1920 Smuts nominated Roberts to represent “Native” interests in the all-white Senate and appointed him to the Native Affairs Commission. Political work soon monopolized his waking hours, as he served on numerous government commissions and went on annual tours to consult with African communities across the country.

While the 1920s saw the curtailment of Roberts’s observational activity, he used his position in government to advance astronomical research, notably supporting the establishment of the Lamont-Hussey Observatory at Bloemfontein. He also worked to promote astronomy among South Africans, lecturing widely and corresponding with aspiring scientists. Alan Cousins, later an important figure in standardizing photoelectric photometry, was one of the astronomers inspired by Roberts’s mentorship.

Historical Note continued...

Roberts earned many accolades and honors during his lifetime. He was the first recipient of an Honorary Doctorate of Science from the University of the Cape of Good Hope (now UNISA), was elected fellow of the Royal Astronomical Society, the Royal Society of Edinburgh, and the Royal Society of South Africa. The South African Association for the Advancement of Science (S2A3) awarded him the South Africa Medal and he served as the Association's president in 1913. He also acted as President of the Astronomical Society of South Africa in 1927-28.

After his death in 1938, the mass of Roberts's variable star data was donated to the Boyden Observatory. There it remained largely undisturbed until the 1990s, when scholars began to rediscover its historical and scientific value. With the assistance of the British Library's Endangered Archives Programme, the Centre for Astronomical Heritage digitized the records in 2019.

Roberts's observational records are available online at <http://eap.bl.uk/collection/EAP1190-1-1>
For a comprehensive biography, see Keith Snedegar, *Mission Science and Race in South Africa, A.W. Roberts of Lovedale* (Lanham, Maryland: Lexington Books, 2015).

It is only fitting that Roberts's contributions to variable-star astronomy are being remembered at the 2024 International Astronomical Union (IAU) General Assembly in Cape Town as he was South Africa's official delegate to the IAU General Assembly held in Cambridge, England, 99 years earlier!

Article by Keith Snedegar

Contact us

<https://royalsocietysa.org.za/>

E-mail: royalsociety@uct.ac.za

Please send your news items to
Marilize Le Roes-Hill
at
mleroes@gmail.com

