Australian Association of von Humboldt Fellows

The Royal Society of Victoria

Unterstützt von / Supported by

Alexander von Humboldt Stiftung/Foundation

Humboldt Kolleg/Joint Symposium

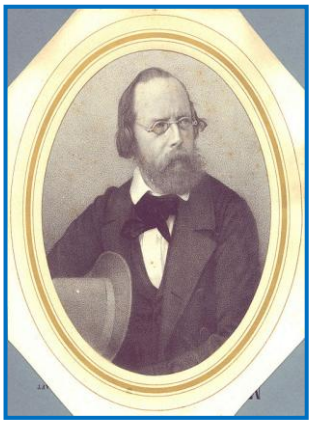
The Australian Association of von Humboldt Fellows and The Royal Society of Victoria

Celebration of German Contributions to Australian Science and Victorian Scientific Institutions - Past and Present

Venue: The Royal Society of Victoria, 8 La Trobe Street, Melbourne
Dates: 1st-3rd October, 2014

von Mueller

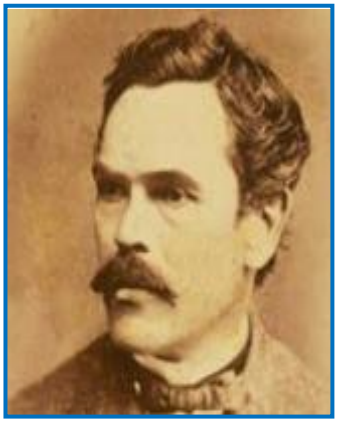
von Neumayer



Becker

Blandowski

Ulrich



Beckler

Kruse

Acknowledgements

The following are acknowledged for their support towards this Joint Symposium:

Alexander von Humboldt Foundation through the award of a **Humboldt Kolleg**
The University of Melbourne for financial support towards the registration costs of Early Career Researchers
The State Government of Victoria for support for the celebration of the Day of German Unity
Embassy of the Federal Republic of Germany for financial support, particularly for the celebration of the Day of German Unity
Ms Katie Wood, Archivist, Access and Outreach and Curator, Malcolm Fraser Collection, The University of Melbourne Archives, University Library, for her work to establish historical German connections to The University of Melbourne
Mr Michael Pearce SC, Honorary Consul-General of the Federal Republic of Germany, Melbourne for support and encouragement
Ms Marian Schoen, Executive Director, EU Centre on Shared Complex Challenges, The University of Melbourne for her support
Dr Anne-Marie Schleich, former Consul-General of the Federal Republic of Germany, Melbourne for her support
Mr Peter Tesch, formerly the Australian Ambassador to the Federal Republic of Germany for his support
Australian Association of von Humboldt Fellows
The Royal Society of Victoria

Cover Attributions

L. Becker: Scan of an original etching (*ca* 1861) held by Lotte Hoffmann-Kuhnt, a descendant of the Becker family from Darmstadt; Wikimedia Commons
H. Beckler: State Library of Victoria
W. Blandowski: Self Portrait, 1860; State Gallery of Victoria: Wikimedia Commons
J.A. Krause: La Trobe Australian Manuscripts Collection, State Library of Victoria
G. Ulrich: "Beneath our Feet" Celebrating 150 Years of the Geological Survey of Victoria, Department of State Development and Business Innovation website
F. von Mueller: Wikipedia Commons
G. von Neumayer: From 1909; Wikimedia Commons
The Royal Society of Victoria, 2009: Held in RSV Collections, Watercolour by Artist Tony Broughton

The German scientists and artists named above contributed to the establishment of: The Royal Botanic Gardens, National Herbarium, Flagstaff Observatory, Museum Victoria, Pharmacy Board of Victoria, Victorian College of Pharmacy, The University of Melbourne and The Royal Society of Victoria

Humboldt Kolleg/Joint Symposium

"Celebration of German Contributions to Australian Science and Victorian Scientific Institutions – Past and Present"

Venue: The Royal Society of Victoria, 8 La Trobe Street, Melbourne

Dates: 1st - 3rd October, 2014

Aim

To celebrate past and present German contributions to Australian Science and Victorian Scientific Institutions.

Themes of the Symposium

German scientists made enormous contributions to the development of science in Victoria through their involvement with The Royal Society of Victoria (RSV). They also participated in the establishment of the National Herbarium, the Royal Botanic Gardens, Museum Victoria, The University of Melbourne, the Flagstaff Observatory for Geophysics, Magnetism and Nautical Science, the Pharmacy Board of Victoria and the Victorian College of Pharmacy, most of which remain internationally highly regarded centres of scientific research to this day. The symposium will give an historical outline of the contributions by German scientists and illustrators to Victorian institutions and to their fields of science.

The Symposium will also explore the increasing diversity and international nature of science in the past 160 years. To this end it will examine the broad fields of various pioneering scientists and the transition within these fields of research to the present day. By concentrating on key fields of Australian Alexander von Humboldt Fellows and other researchers, the Symposium will demonstrate how complex modern science has become and how this complexity enhances and encourages international collaboration.

The **Symposium Programme**, as presented in the following pages, consists of an initial Public Lecture, nine Plenary Lectures and 35 Contributed Papers arranged in two parallel sessions, A and B. All **Plenary Lectures will be presented in the Ellery Theatre. Contributed Papers in the A and B series will be presented in either the Ellery Theatre or the von Mueller Room**, as directed by the respective session Chairpersons.

This booklet also contains an **abstract for each presentation and brief biodetails for each presenter**. An **index** to these details is presented **at the end of the booklet** together with a **list of registrants**.

Organising and Programme Committee

Dr Jillian De Araugo, Executive Officer, Royal Society of Victoria
Dr Matthew Digby, Department of Zoology, University of Melbourne
Associate Professor Trevor Finlayson, Honorary Secretary, Australian Association of von Humboldt Fellows and Honorary Principal Fellow, University of Melbourne
Professor Rod Home AM, School of Historical and Philosophical Studies, University of Melbourne
Dr Doug McCann, Royal Society of Victoria
Professor Gabrielle McMullen AM, President, Australian Association of von Humboldt Fellows and Mary Aikenhead Ministries, Bondi Junction, NSW
Professor Paul Mulvaney, School of Chemistry and Bio21 Institute, University of Melbourne
Professor Lynne Selwood, Past President, Royal Society of Victoria and Department of Zoology, University of Melbourne

Symposium Programme

Wednesday, 1st October

5:30 pm **Registration**

6.15-6.30 pm **Symposium Opening**
Chairperson: Professor Rod Home AM
Welcome: Mr Joseph Reichhardt, Deputy Ambassador, Federal Republic of Germany
Dr William Birch, President, Royal Society of Victoria
Professor Gabrielle McMullen AM, President, Australian Association of von Humboldt Fellows

6:30-7:00 pm **Public Lecture:** Professor Gabrielle McMullen AM, *Noted Colonial German Scientists and Their Contexts*

7:00-7:45 pm **Discussion Forum:** with Panel comprising Professor Gabrielle McMullen AM, Professor Rod Home AM (Chair), Dr Tom Darragh and Dr Doug McCann

7:45 pm **Reception in RSV Burke and Wills Room**

Thursday, 2nd October

8:30 am **Registration**

9:00 am **Chairpersons:** Professor Lynne Selwood and Dr Doug McCann
9:00-9:40 am **Plenary Lecture 1:** Professor Timothy Entwisle, *`Entwisleia Bella,' Hobart's Wollemi Pine*

9:40-10:00 am	**A1:** Mr Matthew Le Feuvre, *Triple Jeopardy in the Tropics: Assessing Extinction, Risk and Diversity in Western Australia's Freshwater Biodiversity Hotspot*	**B1:** Dr Frank Leahy, *William Brahe and Julius Lohmeir: Unsung Heroes of the Burke and Wills Expedition*
10:00-10:20 am	**A2:** Ms Rachel Fowler, *Classification and Biogeography of the Australian Plant Genus `Eremophilia' (Myoporaceae)*	**B2:** Dr Bill Birch, *George H.F. Ulrich: His Mineralogical and Geological Legacy*

10:20-10:50 am **Morning Tea**

10:50 am **Chairpersons:** Dr Matthew Digby and Dr Linden Gillbank
10:50-11:30 am **Plenary Lecture 2:** Dr Peter Giere, *James Peter Hill and the Australian Mammal Fauna: Monotremes and Marsupials in the Embryological Collection in the Museum für Naturkunde, Berlin*

11:30-11:50 am	**A3:** Dr. Brandon Menzies, *Life in a Pouch: A Window into Development*	**B3:** Professor Wallace Kirsop, *German Science in Nineteenth-Century Australian Libraries*
11:50-12:10 pm	**A4:** Dr Stephen Frankenberg, *The Evolution of Pluripotency*	**B4:** Dr Barry Clark, *Influences of German Science and Scientists on Melbourne Observatory*

12:10-1:10 pm **Lunch**

1:10 pm	**Chairpersons:** Associate Professor Kay Double and Associate Professor Walter Veit	
1:10-1:50 pm	**Plenary Lecture 3:** Professor Geoff McFadden, *Malaria: the Plant Connection*	
1:50-2:30 pm	**Plenary Lecture 4:** Dr Sara Maroske, *From Economic Botany to Ecology: Ferdinand Mueller's 'Select Extra-tropical Plants Readily Eligible for Industrial Culture or Naturalisation,' 1871-1929*	
2:30-2:50 pm	**A5:** Dr Camilla Hill, *Crop Systems Biology: Towards Finding the Molecular Basis of Quantitative Traits in Bread Wheat*	**B5:** Dr Doug McCann, *The German Contribution to the Founding of the Royal Society of Victoria*
2:50-3:20 pm	**Afternoon Tea**	
3:20 pm	**Chairpersons:** Professor Geoff McFadden and Dr Frank Leahy	
3:20-4:00 pm	**Plenary Lecture 5:** Associate Professor Laura Parry, *From Marsupials to Medicine: Discovery of Treatments for Heart Disease*	
4:00-4:20 pm	**A6:** Associate Professor Adrian Dyer, *Seeing in Colour: A Hundred Years of Studies on Bee Vision Since the Work of the Nobel Laureate Karl von Frisch*	**B6:** Professor Allan Bretag, *Myotonic Diseases: From Asmus Julius Thomas Thomsen (1815-1896) and Peter Emil Becker (1908-2000) to Recent German-Australian Collaborations*
4:20-4:40 pm	**A7:** Dr Matthew Digby, *Exploration of the Identity, Expression and Function of Whey Proteins*	**B7:** Associate Professor Walter Veit, *Missionaries and Their Anthropological Instructions*
4:40-5:00 pm	**A8:** Dr Jenny Gunnersen, *Sez6 Proteins are Important for Excitatory Synapse Development and Maintenance*	**B8:** Associate Professor Peter Monteath, *Erhard Eylmann in Australia*
5:00-5:20 pm	**A9:** Mr Matthias Könning, *Myelin Regulatory Factor as a Key Regulator of Oligodendrocyte Differentiation and Myelin Maintenance*	**B9:** Associate Professor Trevor Finlayson, *The Alexander von Humboldt Foundation: Outcomes for Australian Science and Scholarship*
6:00 pm	**Informal Evening Meal**	

Friday, 3rd October

8:30 am	**Registration**	
9:00 am	**Chairpersons:** Dr Bill Birch and Professor Gabrielle McMullen AM	
9:00-9:40 am	**Plenary Lecture 6:** Professor Dr Cornelia Lüdecke, *Lamont's Seed – Georg von Neumayer's Interest in Magnetism, Meteorology and Astronomy*	
9:40-10:00 am	**A10:** Professor Chris Wilson, *Cyclic Deformation in Ice and Impact of Grain-scale Processes in Polar Ice*	**B10:** Dr Harry Allen, *The Blandowski/Krefft Expedition to the Murray River 1856-7: Assessing its Gains and Losses*
10:00-10:20 am	**A11:** Ms Julie Boyce, *Volcanoes of Victoria: The Still Active Newer Volcanics Province of Southeastern*	**B11:** Ms Eliza Tree, *William Blandowski – Insights From an Outsider: Visions of Aboriginal*

	Australia	*Australia*
10:20-10:50 am	**Morning Tea**	
10:50 am	**Chairpersons:** Professor Allan Bretag and Associate Professor Peter Monteath	
10:50-11:30 am	**Plenary Lecture 7:** Professor Paul Mulvaney, *Playing with Colour – The World of Quantum Dots*	
11:30-11:50 am	**A12:** Professor Dr Peter Schwerdtfeger, *Playing with Pentagons and Hexagons – The Wonderful and Rich Mathematical World of Fullerenes*	**B12:** Professor Rod Home AM, *Ferdinand Mueller and the Royal Society of Victoria*
11:50-12:10 pm	**A13:** Dr Dirk Andrae, *Studies of Complete Classes of Compounds in Chemistry, Pharmacy and Materials Science*	**B13:** Dr Linden Gillbank, *Ferdinand Mueller and the Making of Australian Botany: Using the Collections of Ludwig Leichhardt and Hermann Beckler*
12:10-12:30 pm	**A14:** Dr Ross Marceau, *Atom Probe Tomography: 3D Chemical Analysis with Near-Atomic Spatial Resolution*	**B14:** Dr Stephen Jeffries, *'Collecting Systematically': Hermann Beckler and the Making of an Australian Botanical Collector*
12:30-12:50 pm	**A15:** Dr Lars Goerigk, *London-dispersion and its Effects on Chemical Properties and Biomolecular Structures*	**B15:** Professor Walter Bloom, *The Significant Contribution of German Numismatists to Cultural Life in Australia*
12:50-1:10 pm	**A16:** Associate Professor Ute Roessner, *Identifying Novel Salinity Tolerance Mechanisms by Spatial Analysis of Lipids in Barley Roots*	
1:10-2:10 pm	**Lunch**	
2:10 pm	**Chairpersons:** Professor Paul Mulvaney and Professor Walter Bloom	
2:10-2:50 pm	**Plenary Lecture 8:** Professor Lloyd Hollenberg, *Quantum Reality Bytes – the Dawning Age of Quantum Information Technology*	
2:50-3:10 pm	**A17:** Dr Eva-Maria Anton, *Spintronics – Past and Future Innovations in Data Storage*	**B16:** Dr Yuan Mei, *Modelling Metal Transport in the Deep Earth Using Supercomputers*
3:10-3:30 pm	**A18:** Dr Jared Cole, *Quantum Electronics – Fast, Cold, Fragile, Beautiful*	**B17:** Professor Dr Emilio Badoer, *Resistin, a Novel Hormone from Fat*
3:30-4:00 pm	**Afternoon Tea**	
4:00 pm	**Chairperson:** Associate Professor Trevor Finlayson	
4:00-4:40 pm	**Plenary Lecture 9:** Professor Dr Gerhardt Wortmann, *Nobel Laureate, Rudolf Mössbauer, and Subsequent Australian Science*	
4:40-4:55 pm	**Summary and Symposium Closure** Dr Bill Birch, President, Royal Society of Victoria Professor Gabrielle McMullen AM, President, Australian Association of von Humboldt Fellows	

6:00-8:30 pm **Evening Celebration – Day of German Unity**
Venue: Sir Redmund Barry Room, 55 Collins Street, Melbourne
Master of Ceremonies: Mr Michael Pearce SC, Honorary Consul-General

6:30 pm **National Anthems of Australia and Germany:** Mr Lucas de Jong

Welcoming Comments:
The Honorable Matthew Guy, Minister for Multicultural Affairs and Planning
Dr William Birch, President, Royal Society of Victoria
Professor Gabrielle McMullen AM, President, Australian Association of von Humboldt Fellows
Professor Margaret Sheil, Provost, The University of Melbourne

Presentation to Catherine Jane Gosling of the Verdienstkreuz am Bande des Verdienstordens der Bundesrepublik Deutschland:
Mr Joseph Reichhardt, Deputy Ambassador, Federal Republic of Germany

Response: Ms Catherine Gosling

Abstracts and Biodetails

The Blandowski/Krefft Expedition to the Murray River 1856-7: Assessing Its Gains and Losses

H. Allen
Department of Anthropology, University of Auckland, Auckland, New Zealand

Following Blandowski's return from the Murray River in 1857, controversies overshadowed the scientific contributions made by Blandowski and Gerard Krefft. Yet the expedition was pioneering in that it represented the first survey of the zoology and anthropology of the northern part of the State of Victoria. Collections and illustrations were made of mammals, birds, reptiles, fish and insects, where much use was made of Aboriginal collectors. Alongside these activities, Blandowski and Krefft observed and illustrated Aboriginal activities and collected Aboriginal names (mostly Nyeri Nyeri language) for many of the specimens they collected. This paper documents the scope and the fate of these collections in Australia and Germany, and the circumstances which have determined what we have gained and what we have lost.

Dr Harry Allen

Harry Allen is an Honorary Research Fellow in Anthropology at the University of Auckland, an Honorary Associate in the Archaeology programme, La Trobe University and Research Associate with Melbourne Museum. His interest in Blandowski is one part of a career that includes Australian and New Zealand archaeology and, most recently, the study of Australian Aboriginal projectile technology. He first became aware of William Blandowski and Gerard Krefft when he was researching his PhD on the Walls of China under the guidance of John Mulvaney and Jim Bowler. In 2007, with the Royal Society of Victoria, he organised a symposium in Mildura to celebrate the 150th anniversary of Blandowski's Expedition to the Murray. The papers from this symposium were published as Volume 121 of the *Proceedings and Transactions of the Royal Society of Victoria* (edited by Harry Allen and Elizabeth Weldon). Harry Allen published *William Blandowski's Encyclopaedia of Aboriginal Australia* in 2011 (Aboriginal Studies Press), the result of researching Blandowski's collections in the UK, Germany and Poland.

Studies of Complete Classes of Compounds in Chemistry, Pharmacology and Materials Science

D. Andrae
Institute of Chemistry and Biochemistry, Freie Universität Berlin, Germany

Studies of the chemical and physical properties of chemical compounds and materials are an important part of scientific research. In theoretical approaches, many properties of a target compound or material can nowadays be calculated to good, often even to very good, accuracy. This involves the application of some sophisticated tools of quantum chemistry or theoretical solid-state science, always with high demand for computer resources.

Frequently, however, a scientist's interest is not focussed on a single compound or material, but on a larger set of compounds or materials. For example, he might be interested in a certain property, but wants to know that for all the possible substitutional derivatives of a given parent compound with substituents taken from a predefined set. Such topics quickly lead to questions of combinatorial chemistry. A theoretical approach to this topic is almost free from the limitations of the experimental approach. There are no limits on the types of compounds (they could be inorganic, and rather complex) and no mastery of convenient reactions for high-throughput synthesis and screening required. Limitations do come, as often in combinatorial approaches, from the number of cases to be taken into account; such numbers can become enormous surprisingly fast. The complexity of the situation can be mastered with the help of mathematical tools for systematic counting and structure generation. A few examples will be shown, with compounds taken from chemistry, pharmacology and materials science.

PD Dr Dirk Andrae

Chemist by education, Dr Andrae is Senior Lecturer and Senior Research Scientist in Physical and Theoretical Chemistry at the Institute of Chemistry and Biochemistry of Freie Universität Berlin, Germany. His research achievements are in fundamental and applied quantum mechanics, quantum chemistry, atomic and molecular physics and solid-state science. He has suggested the Surface Template Technique as a general method for the direct, controlled formation of arbitrarily complex, knotted, molecular structures, including fabrics from single-strand polymers. Dr Andrae is a member of the AAAS, of the ACS, of the WATOC, and of the national societies of Theoretical Chemists in France (RFCT) and in Germany (AGTC).

Spintronics – Past and Future Innovations in Data Storage

E.-M. Anton, B.J. Ruck, F. Natali and H.J. Trodahl
The MacDiarmid Institute for Advanced Materials and Nanotechnology, School of Chemical and Physical Sciences, Victoria University of Wellington, New Zealand

Spintronics is a rapidly developing field of research that has found important application in the computer industry. Whereas classical electronics only exploit the charge of the electrons, spintronics make use of both the charge and the spin, a quantum phenomenon that can be depicted as a rotation direction and thus magnetic orientation of the electron.

The discovery of giant magnetoresistance in the 1980s marks the beginning of the success story of spintronics. It led to a new class of data storage that was commercialized less than 10 years after the discovery of the fundamental effect and was acknowledged with the physics Nobel Prize awarded to Fert and Grünberg in 2007. The early research and devices made use of ferromagnetic metals in order to manipulate and exploit the spin direction of the electrons. Nowadays, researchers focus on the use of magnetic semiconductors to combine the advantages of semiconductor devices with the new opportunities spintronics has to offer. This step poses a challenge to materials science, as the combination of ferromagnetism and semiconducting properties is hard to achieve. This presentation will summarize the amazing past development of data storage devices and give an insight into modern spintronics research.

Dr Eva-Maria Anton

Dr Eva-Maria Anton received her diploma in materials science in 2008 and her PhD on lead-free piezoceramics in 2011 from the Technische Universität Darmstadt, Germany, supervised by Professor Jürgen Rödel. During her studies she carried out research projects at Purdue University, Indiana and at EPFL Lausanne, Switzerland. After completing her PhD, Eva was awarded a two-year Feodor-Lynen fellowship to work on magnetic thin films for spintronics applications with Dr Ben Ruck and Professor Joe Trodahl at Victoria University of Wellington, New Zealand. Since June 2014 she continues to work in the spintronics group as a MacDiarmid postdoctoral fellow. Her research interests involve the fabrication and characterisation of rare-earth-nitride, thin-film structures, with the aim to incorporate these materials into MRAM and other spintronic devices. The sample growth is performed using molecular beam epitaxy in ultra-high-vacuum and the films are characterised regarding their electronic and magnetic properties, including SQUID, X-ray magnetic circular dichroism and polarised neutron reflectometry.

Resistin, a Novel Hormone from Fat

E. Badoer,[1] H. Habeeballah,[1] N. Alsuhaymi,[1] J. Rathner,[2] S. Kosari[1] and M. Stebbing[1]
[1] School of Medical Sciences, RMIT University, Melbourne, Victoria 3001, Australia
[2] Human Bioscience, Latrobe University, Melbourne, Victoria 3086, Australia

A characteristic of obesity is a marked elevation of sympathetic nerve activity (SNA) to the skeletal muscle blood vessels and to the kidney, which contribute to obesity-induced hypertension. The causes of the increase in SNA are not known. Fat tissue is now recognised as a major endocrine organ that releases many hormones, including leptin, and, as recognized more recently, resistin. Leptin has cardiovascular and metabolic effects that involve actions in the central nervous system, that influence SNA. Leptin, for example, increases SNA to the kidney and brown adipose tissue (BAT), a metabolic organ, but little is known of the effects of resistin.

We investigated the effect of centrally administered resistin (i) on SNA targeting the kidney and BAT, and (ii) the intracellular signalling pathways mediating those changes. We also compared the effects with those of leptin.

Rats were anaesthetised (urethane 1.4 g/kg iv) and SNA to the kidney or brown adipose tissue was recorded using standard methodology. Resistin induced a significant increase in renal SNA by approximately 40%, which was similar to the effect of leptin. In contrast, the effect of resistin on SNA to brown adipose tissue was opposite to that of leptin.

The findings indicate that resistin increases renal sympathetic nerve activity but reduces SNA to brown adipose tissue. Since the plasma levels of resistin are elevated in obesity, resistin may contribute to the cardiovascular and metabolic dysfunction in obesity.

Professor Dr Emilio Badoer

Professor Badoer is Professor of Neuropharmacology in the School of Medical Sciences, RMIT University and the Head of the Neuropharmacology and Neuroinflammation Laboratory which has a strong integrative cardiovascular/neuroscience focus. His work is recognised nationally and internationally. He has over 80 peer-reviewed publications. He is an expert assessor for several grant-giving bodies including the NHMRC (GRP Panel Member) and the NHF of Australia as well as the Wellcome Trust (England). He is currently a member of the NMHRC Assigners Academy. His expertise is utilised as an expert assessor for a number of international journals including the prestigious *American Journal of Physiology*, *British Journal of Pharmacology*, *Journal of Comparative Neurology*, *Neuroscience* and *Nature Neuroscience Reviews*. He is a member of several national and International scientific societies, was a member of the executive for the High Blood Pressure Research Council of Australia and is on the executive of the Australian Physiological Society. Currently, he is national Treasurer of the Australasian Society of Clinical and Experimental Pharmacologists and Toxicologists.

George H.F. Ulrich: His Mineralogical and Geological Legacy

W.D. Birch
Geosciences, Museum Victoria, GPO Box 666, Melbourne, Victoria, 3001, Australia

George Henry Frederick Ulrich (1830-1900) was Victoria's first and only classically-trained mineralogist of the 19th Century. He was born in Zellerfeld, Germany, and educated in the famous Royal Academy of Mines at Clausthal, graduating with distinction in 1851. Following his arrival in Victoria in 1853, he spent four years on the goldfields and then joined Alfred Selwyn's Geological Survey in 1858. He was a key member of the team of skilled geologists who prepared the famous quarter sheet maps covering central Victoria, contributing to 11 of them, including those covering the Castlemaine and Maldon goldfields. Following the disbanding of the Geological Survey in 1869, Ulrich was appointed Curator of Minerals at the newly formed Industrial and Technological Museum, and commenced building a substantial collection of local and foreign minerals, rocks and ores. He also lectured in mining at the University of Melbourne and practised as a consultant. In 1878 he accepted an offer from the University of Otago in Dunedin, New Zealand, to establish a School of Mines which flourished under his leadership, gaining an international reputation for the high quality of its graduates. After his untimely death due to a fall while on fieldwork in 1900, the University of Otago established the Ulrich memorial medal in his honour.

George Ulrich had diverse interests and expertise, as is well illustrated by his publications ranging from reports on his quarter-sheet maps, through observations on ore deposits in Victoria, Tasmania, New South Wales and New Zealand, to descriptive catalogues of museum collections. He is immortalised in the mineralogical world by his recognition in 1870 of the first new mineral to be described in Australia, the gold-bismuth alloy which he named maldonite after the Maldon goldfield. In turn, he was commemorated by the naming of another new Victorian mineral, ulrichite, in 1988. More recently there has been renewed interest in the origin of gold–bismuth–tellurium ore deposits, in which maldonite is a rare constituent.

Dr William Birch

William (Bill) Birch retired from the position of Senior Curator in geosciences at Museum Victoria at the end of 2013 after a 40-year career. He is currently an Honorary Research Associate. His main research interest has been in characterising assemblages of secondary minerals in various geological environments, particularly Broken Hill, NSW, and several Victorian localities. He has also researched gemstones and volcanic rock suites in Victoria. He has edited six books and published over 200 papers and articles, as well as serving on committees of state, national and international organisations.

The Significant Contribution of German Numismatists to Cultural Life in Australia

W.R. Bloom
School of Engineering and Information Technology, Murdoch University,
Western Australia 6150, Australia
Department of Maritime Archaeology, Western Australian Museum, Perth,
Western Australia 6000, Australia

Australian science has benefited considerably through contacts with Germany over more than 150 years. However German migration to Australia in the 19th century saw not only talented scientists coming, but also other German-trained professionals including technologists, gifted artisans and merchants, who greatly enriched the cultural life of the country. One of these was pharmacist Heinrich (Henry) Heuzenroeder (1820-1898), who sailed to Australia in 1847 on the *Hermann von Beckerath* as a cabin passenger (along with botanist Baron Sir Ferdinand Jakob Heinrich von Mueller). Another was Adolf Frederick Emil Vosz (1842–1868), a collector who arrived in Australia with his parents on the *Alfred* in December 1848.

Heuzenroeder and Vosz arrived just three years before the appearance of the first tokens of private merchants, introduced to alleviate the shortage of small coins engendered by the rapid expansion of the Colonies with the discovery of gold. Both were keen collectors of these pieces, and their collections now reside in the Art Gallery of South Australia. But Heuzenroeder was more than a collector; he relayed numismatic information to Berlin for publication in the local journals. This talk will focus on the role these two numismatists played in highlighting these fascinating items of unofficial currency.

Professor Walter Bloom

Walter Bloom is Emeritus Professor of Mathematics at Murdoch University, his retirement in 2011 following a career of 36 years at this university. He holds a PhD from ANU and a DSc from The University of Tasmania, has been awarded both Fulbright and AvH Fellowships, and is an Honorary Life Member and Fellow of the Australian Mathematical Society. Walter is also Honorary Numismatist at the Western Australian Museum, a position he has held for 17 years, and has been presented with the Ray Jewell Silver and Paul Simon Memorial Awards for excellence in numismatics. The Alexander von Humboldt Foundation has been supporting Walter in a numismatic project on Mintmasters and Mintmarks, which he is carrying out at the Berlin Coin Cabinet in the Bode Museum in Berlin. Walter is also editing a History of the South Australian numismatic collection, which is being written by their Honorary Numismatist, Peter Lane. It is through these activities that his interest in these great German contributors to cultural life in Australia has developed.

Volcanoes of Victoria: The Still Active Newer Volcanics Province of Southeastern Australia

J.A. Boyce, I.A. Nicholls, R.R. Keays and P. Hayman
School of Earth, Atmosphere and Environment, Monash University, Clayton, Victoria 3800, Australia

The Pliocene–Recent Newer Volcanics Province (NVP) of southeast Australia constitutes the most recent phase of volcanic activity on the continent. With eruptions spanning from ~8 Ma to *ca* 5000 BP, the province is considered active, yet no volcanic contingency plans are in place.

The NVP, and in particular the Mt Rouse magmatic volcanic complex, were studied in detail using desktop, fieldwork and laboratory-based techniques to gain further insights into the petrogenesis and occurrences of monogenetic volcanism in southeast Australia. A collation of eruption centres in the NVP was produced that documents >437 eruption centres from >729 vents, including many previously unmapped centres.

The volcanic facies of Mt Rouse were examined using field mapping and geochemical analysis. Mt Rouse is extremely complex, having erupted three chemically distinct magma batches (labelled magma batches A, B and C) during an eruption sequence involving three stages and multiple sub-stages. Magma batches A, C and B were erupted sequentially and then batches A and B were erupted simultaneously. The magmas were sourced from a zone extending across the lithosphere–asthenosphere boundary.

This study has helped constrain the nature of volcanism in the NVP and will aid in the generation of hazard maps and volcanic contingency plans for Victoria.

Ms Julie A. Boyce

Julie Boyce (MGeosci, Hons) is currently a Research Associate at Monash University, Melbourne, Australia. Julie completed a Master of Geoscience at Keele University, UK, where she studied the welded air-fall tuff of the Middle Pumice eruption of Santorini, Greece. She then spent three months at the Smithsonian Museum of Natural History, Washington D.C., where she conducted research relating to the oxygen fugacity of the Earth's mantle. Recently, Julie has submitted her PhD thesis through Monash University, on the stratigraphy, geochemistry and origin of products of complex volcanic centres in the Newer Volcanics Province of southeastern Australia. Julie has published journal articles relating to her research on Santorini and the Newer Volcanics in *The Journal of Volcanology and Geothermal Research*, *The Australian Journal of Earth Sciences* and *Geology Today*; and has written web content for the Volcanoes Discovery Centre in Penshurst, Victoria. She is a member of The Royal Society of Victoria, the Geological Society of Australia, IAVCEI—International Association of Volcanology and Chemistry of the Earth's Interior, the Australian Institute of Geoscientists, the Mineralogical Society of America and the Associazione Italiana di Vulcanologia.

Myotonic Diseases: From Asmus Julius Thomas Thomsen (1815-1896) and Peter Emil Becker (1908-2000) to Recent German-Australian Collaborations

A.H. Bretag
School of Pharmacy and Medical Sciences, University of South Australia, Adelaide, SA 5000, Australia

Julius Thomsen first published his account of myotonia (an unusual muscle stiffness disorder) in himself and his family in 1876. By November 1971, Peter Becker was already famous for his eponymous Becker Muscular Dystrophy when he came to the Second International Congress on Neuromuscular Diseases, in Perth. There, he presented, for the first time, an extensive study of myotonia, recognising a recessively inherited disease (now known as Becker's Recessive Generalised Myotonia), distinct from Thomsen's Myotonia Congenita and clearly distinguishable from Steinert's Myotonic Dystrophy, both dominantly inherited.

Peter Becker, Shirley Bryant, Reinhardt Rüdel and I, all met in Perth, giving research papers on myotonia. During my Humboldt Fellowship (1972-73), I worked with Robert Stämpfli in Homburg/Saar but also spent time in Heidelberg with Rüdel. I returned briefly in 1977 to visit Becker in Göttingen and, later, in 1978, worked with Bryant's myotonic goats in Cincinnati.

My research on Thomsen's, Becker's and Steinert's Myotonias has since progressed to confirmation of Bryant's "chloride hypothesis" through a molecular genetic study of the "culprit" muscle chloride channel, CLC-1. This has culminated in several collaborative papers with German colleagues and a chapter, "CLC-related proteins in diseases" in the *Handbook of Ion Channels* (CRC Press, 2015).

Professor Allan H. Bretag

Allan Bretag is an Adjunct Professor in the School of Pharmacy and Medical Sciences at the University of South Australia (UniSA). He attended The University of Adelaide (graduated with Honours, 1965), returning as a Junior Lecturer and simultaneously undertaking his PhD project (completed, 1971). His postdoctoral research was with Robert Stämpfli at the University of the Saarland, Germany, as an Alexander von Humboldt Fellow. Following employment as a Lecturer at UniSA, he has taken sabbatical leave to work with Oger Rougier at the Claude Bernard University in Lyon, with Richard (Lord) Adrian at Cambridge University and with Shirley Bryant at the University of Cincinnati. He was appointed Honorary Visiting Research Fellow at The University of Adelaide (1988) and promoted to full Professor of Physiology at UniSA (1997). His research has been devoted to ion channels and channelopathies. He is an Honorary Associate Member of the Australian and New Zealand Association of Neurologists, Honorary Member of the Australian Physiological Society, Emeritus Member of the Society of General Physiologists, Vice-President and Director of Research of Muscular Dystrophy South Australia, Executive Board Member of the Asian and Oceanian Myology Center (Tokyo) and President of the World Alliance of Neuromuscular Disorder Associations (The Hague).

Influences of German Science and Scientists on Melbourne Observatory

B.A.J. Clark
Astronomical Society of Victoria Inc
PO Box 1059, Melbourne, Victoria 3000, Australia

The multidisciplinary approach of Alexander von Humboldt in scientific studies of the natural world in the first half of the 19th century had early and lasting acclaim. Later, given the broad scientific interests of colonial Victoria's first Government Astronomer, Robert Ellery, one could expect to find some evidence of the Humboldtian approach in the operations of Williamstown Observatory and its successor, Melbourne Observatory. On examination, and without discounting the importance of other international scientific contributions, it appears that Melbourne Observatory was indeed substantially influenced from afar by Humboldt and other German scientists, and in person by Georg von Neumayer in particular. Some of the ways in which this influence acted are obvious but others are less so. Especially in its later years, the Observatory appeared rather indifferent to the astrophysical opportunities opened up by Planck, Einstein and others, choosing instead to concentrate its diminishing resources on timekeeping and positional astronomy right up to its closure as a professional observatory in 1945.

Dr Barry Clark

Barry qualified in mechanical engineering and physics but his interest in telescope making led to a job in a military optics laboratory. Lecturing part-time to optometry students opened a path to higher degrees in physiological optics. A passion for flying resulted in a career shift into aviation human factors, specialising in visual performance. Nearly twenty years ago he retired from his Senior Principal Research Scientist position in the Australian Defence Science and Technology Organisation. This allowed more time for his 'pet project' in transport accident causation and particularly his long standing interest in amateur astronomy.

Barry is a Tregear Medallist, Honorary Life Member and Director of the Outdoor Lighting Improvement Section of the Astronomical Society of Victoria (ASV). He has been using and demonstrating telescopes at Melbourne Observatory for almost sixty years and is a member of the ASV volunteer team working at Museum Victoria on the reconstruction of the Great Melbourne Telescope of 1869. His historical studies of Melbourne Observatory are an outcome of the need for increased heritage protection of the Observatory.

Quantum Electronics - Fast, Cold, Fragile, Beautiful

J. Cole
Chemical and Quantum Physics, School of Applied Sciences, RMIT University, Melbourne, Victoria 3001, Australia

The growing field of quantum engineering is taking advantage of the weird properties of quantum mechanics to design and build new and exciting electronic devices. Using advanced fabrication, cooling and measurement techniques - we can now build transistors, logic gates, sensors and clocks with unprecedented efficiency and precision. This combination of traditional electronic engineering and quantum physics promises to be instrumental in the technology of the 21st century.

Dr Jared Cole

Jared Cole is a senior research fellow in the School of Applied Sciences at RMIT University. He is a theoretical physicist, specialising in quantum theory and its application in electronics, computing and condensed-matter physics. After completing a PhD in theoretical physics at the University of Melbourne, Jared was awarded an Alexander von Humboldt Fellowship to work at Karlsruhe University with the group of Professor Dr Gerd Schön. Following this and a subsequent appointment as a faculty postdoctoral researcher in Karlsruhe, he returned to Australia to take up his current position as a RMIT Vice-Chancellor's Senior Research Fellow. His research interests include quantum circuit theory, spin physics, decoherence, measurement and entanglement theory, quantum metrology and computing.

Exploration of the Identity, Expression and Function of Whey Proteins

M. Digby, J. Tang, M. Famílari and M. Wilson
Department of Zoology, University of Melbourne, Victoria 3010, Australia

Mammalian neonates have an absolute requirement for milk. In addition, human and animal studies show that optimal development only results from the ingestion of the mother's milk. This has generally been assumed to be due to mother's milk being a superior source of nutrients. Indeed, the major components of milk such as protein, sugars, lipids and trace nutrients do differ significantly between species. However, the molecular complexity and dynamic changes of approximately 2,000 milk molecules are generally unappreciated, and their effect on the neonate poorly described.

Analyses of mammary gland gene and protein expression show the group of whey proteins are comprised of approximately 300 individual proteins, and that a neonate receives and ingests a constantly changing composition of whey proteins during the period of lactation. These whey protein changes result in negligible nutritional differences, but possibly provide hormone-like signals from the mother to the infant specific for the developmental and/or environmental circumstances.

The histological evaluation of young pigs fed diets of milk differing only in whey protein components showed marked differences in some epithelial and neuronal structures of the gut. These findings suggest the physiological role of milk, and specifically the whey protein component, during neonatal development is vastly more significant and complex than appreciated.

This work has been funded by Dairy Australia.

Dr Matthew Digby

Since completing his PhD at Howard Florey Institute, Matthew Digby has conducted over seventeen years of industry-funded research within the Department of Primary Industry (Victoria), the University of Melbourne and CSIRO and was a recipient of the 2002 CSIRO Medal for research excellence and commercialisation. In addition, he has held positions at the Peter MacCallum Cancer Institute and the University of Würzburg as an Alexander von Humboldt Fellowship recipient. He is currently the course coordinator of the Master of Biotechnology in the Faculty of Science, University of Melbourne, and coordinates and teaches eight subjects within the course.

Seeing in Colour: A Hundred Years of Studies on Bee Vision Since the Work of the Nobel Laureate Karl von Frisch

A.G. Dyer
School of Media and Communication, RMIT University, Victoria 3000, Australia
Department of Physiology, Monash University, Victoria 3800, Australia

One hundred years ago it was often assumed that the capacity to perceive colour required a large human brain. Then in 1914 a young Austrian researcher working at Munich University in Germany, published evidence that honeybees could be trained to collect sucrose from a 'blue' coloured card, and find the colour amongst a number of different shades of achromatic grey. Von Frisch thus established honeybees as an important model of sensory processing in animals, and for work including his demonstration that bees used a symbolic dance language, he won a Nobel Prize in 1973. This work lead to the establishment of several research groups in Germany that developed a rich understanding of how bee vision has shaped flower colour evolution in the Northern Hemisphere. Recently, following on from research in Germany, it has been possible to bring these research techniques to Australia, which is a high-value, case study due to the long-term geological isolation of the continent. Australian bees have a phylogenetically ancient colour visual system and similar colour perception to honeybees. In Australia, similar patterns of flower colour evolution have resulted and provide important evidence of parallel evolution thanks to the pioneering work of Karl von Frisch 100 years ago.

I acknowledge the Alexander von Humboldt Foundation and Australian Research Council for funding support.

Associate Professor Adrian G. Dyer

Adrian Dyer completed a PhD in Vision Science at RMIT University in 2000 under the supervision of Professors Robin Williams and Bill Muntz (Monash University). In 2002 he joined the Laboratory of Professor Lars Chittka in Würzburg (Germany), investigating bee vision and decision making in complex environments. In 2004 he was a Humboldt Fellow in Mainz and in 2005 took up a postdoctoral position at Cambridge University (UK). In 2008 he received and ARC QEII fellowship to investigate the evolution of flower colours in Australia, and in 2011 took up an Associate Professor position at RMIT University. His work involves a very cross disciplinary approach to understanding insect perception and plant pollination, and involves working with teams of botanists, computer modellers, vision scientists and ecologists.

Entwisleia Bella, Hobart's Wollemi Pine

T.J. Entwisle
Royal Botanic Gardens Melbourne, Private Bag 2000, South Yarra 3141, Australia

Entwisleia bella, a marine alga (or seaweed) described last year by Fiona Scott, Gary Saunders and Gerry Kraft, is not just a new species to science, but a new genus, family and order. It is arguably rarer than Sydney's famous *Wollemia nobilis*, and taxonomically more divergent. It was named after me due to its similarity to *Batrachospermum*, an attractive, addictive and sometimes allusive genus of the freshwater red alga I have been working on for three decades. *Batrachospermum* grows in some of the most beautiful locations on Earth, many in Australia and New Zealand. Between 1980 and 2010 the number of freshwater red algal species known from these two countries rose from seven to 34, most of them endemic to the region. Australia is a fascinating place to study any algae, with plenty to discover and strong endemism in the group I fancied. The freshwater species in particular, are spectacularly beautiful under the microscope and a fascinating part of our native flora, yet they are very poorly studied in Australia. As with so much of our Australian flora, Ferdinand Mueller made some of the earliest collections of *Batrachospermum* and retracing his steps was part of my taxonomic adventure.

Professor Timothy J. Entwisle

Professor Tim Entwisle is a highly respected scientist, scientific communicator and botanic gardens director. He took up the role of Director and Chief Executive of Royal Botanic Gardens in March 2013, following two years in a senior role at Royal Botanic Gardens Kew, and eight years as Executive Director of the Royal Botanic Gardens and Domain Trust in Sydney. Tim is an Honorary Professorial Fellow in the School of Botany at The University of Melbourne and a Visiting Professor in the School of Biological and Biomedical Science, Durham University. He is an expert in freshwater algae (a genus, family and order of algae were named after him last year) but has a broad interest in all plants and related life forms (e.g., he edited and wrote for the four-volume *Flora of Victoria*). Tim blogs, tweets and looks for any opportunity to promote science, plants and gardens. Tim has been a regular contributor to ABC radio and its website, and a frequent guest on Australian radio and television. He has written for a variety of science, nature and garden magazines and maintains an active social media profile (including his popular *Talkingplants* blog).

The Alexander von Humboldt Foundation: Outcomes for Australian Science and Scholarship

T.R. Finlayson
School of Physics and Department of Chemical and Biomolecular Engineering, University of Melbourne, Victoria 3010, Australia

The purpose of this presentation is to outline some of the funding opportunities through the Alexander von Humboldt Foundation, which are available to international researchers within any field of scholarship, to enable them to pursue their research at any one of many German universities and other research institutions.

Recent statistical data for research funding by the Foundation, with particular focus on funding for Australian researchers, will be outlined. These data clearly demonstrate the considerable success which has been afforded to Australian science and scholarship as a result of von Humboldt funding, by comparison with that from other research funding schemes. Some specific examples will be discussed in order to illustrate the significant influence which funding from the Alexander von Humboldt Foundation has had on Australian science and the careers of many Australian scientists.

The financial support from a Humboldt Kolleg for this present joint symposium is gratefully acknowledged.

Associate Professor Trevor Finlayson

Trevor Finlayson, BSc (Q'ld, 1965), PhD (Monash, 1969) is an Honorary Principal Fellow in the School of Physics and the Department of Chemical and Biomolecular Engineering, University of Melbourne. Following his PhD, he was a Research Associate at the Central Electricity Research Laboratories in Leatherhead, England (1969-72) where he was involved in research on superconducting A.C. power transmission. In 1973, he was appointed to the academic staff of Monash University, specifically to create and teach a course in Materials Science for undergraduate students and was promoted to Associate Professor in 1991. In 1977 he was awarded an Alexander von Humboldt Fellowship for collaborative research on superconducting materials at the Forschungsinstitut für Edelmetalle und Metallchemie in Schwäbisch Gmünd and has spent further periods of research collaboration in Germany, with support from the Foundation: 1998 at Ludwig Maximillians Universität, München and 2004 at RWTH-Universität, Aachen, undertaking collaborative research on the dynamical behaviour of shape-memory alloys with Professor Dr Uwe Klemradt. His research focus throughout his academic career has been concerned with structural instabilities in crystalline solids and their influence on material properties. His research interests continue to be in fundamental aspects of martensitic transformations and in the mechanical properties of metal-matrix composites.

Classification and Biogeography of the Australian Plant Genus *Eremophila* (Myoporaceae)

R.M. Fowler,[1,2] M.J. Bayly[1] and D.J. Murphy[2]
[1] School of Botany, University of Melbourne, Victoria 3010, Australia
[2] National Herbarium of Victoria, Royal Botanic Gardens Melbourne, Australia

The family Myoporaceae and the first species of *Eremophila* were described in 1810 by Robert Brown, but it was Victoria's first government botanist, Baron Sir Ferdinand von Mueller, who first took particular interest in this large and uniquely Australian plant genus, describing a further 47 *Eremophila* species and providing the first taxonomic revision of the family in 1859. Today *Eremophila*, commonly known as poverty or emu bushes, form one of Australia's most diverse plant genera. Distributed widely in arid and semi-arid landscapes, there are now over 200 formally described *Eremophila* species, a number likely to increase as additional taxa continue to be discovered and described. Our current understanding of this group is based upon a traditional taxonomic classification which uses morphological characters to determine species groupings and relationships. The aim of my PhD research is to use Next Generation Sequencing technology to gain a molecular-based understanding of the evolutionary history (phylogeny) of *Eremophila* and the family Myoporaceae more generally. I will outline the methods and techniques that I am using to approach this study, and will present my progress to date. In addition, biogeographic applications and host-plant and insect interactions unique to the Myoporaceae will also be discussed.

Ms Rachael Fowler

Rachael Fowler is in the first year of her PhD candidature at the University of Melbourne, School of Botany. Rachael is co-supervised by Dr Michael Bayly (University of Melbourne), Dr Daniel Murphy (Royal Botanic Gardens, Melbourne) and Dr Gerry Cassis (University of New South Wales). To complete her PhD research, Rachael has been awarded a Jim Ross PhD Scholarship through the Cybec Foundation and National Herbarium of Victoria. Prior to the commencement of her PhD, Rachael completed her Bachelor of Science with Honours at Monash University. Her honours research focused on the interaction between a species of native gall wasp (*Trichilogaster acaciaelongifoliae*) and its *Acacia* hosts, using molecular markers to explore geographic and host-based population structuring.

The Evolution of Pluripotency

S. Frankenberg and M.B. Renfree
Department of Zoology, University of Melbourne, Victoria 3010, Australia

Although evolving over the past century, the concept of the pluripotent stem cell took its firmest roots in the early 1970s with the advent of mouse embryonal carcinoma cells and later embryonic stem cells. As initial studies were performed almost exclusively in the mouse, this species established a universal standard for defining the pluripotent stem cell and thus its "fundamental" properties: the ability to self-renew and to contribute to all three embryonic germ layers. However more recent studies have begun to challenge the concept of pluripotency as a fundamental property. It is therefore crucial to understand how potency and early cell lineage specification are regulated in other vertebrates, including non-eutherian mammals such as marsupials. We have examined the emergence of early cell lineages in the conceptus of a marsupial, the tammar wallaby, and shown that certain aspects are surprisingly divergent from the mouse. A curious difference between marsupial and eutherian mammals lies in the pluripotency genes that are present in their genomes. In particular, genes encoding class V POU domain transcription factors have a complex pattern of evolution that may have significance in how different vertebrates specify their early embryonic cells and/or their germ cells.

Dr Stephen Frankenberg

Dr Frankenberg earned his PhD in 2000 from La Trobe University, under the supervision of Professor Lynne Selwood, with a thesis examining early development of the brushtail possum. He subsequently gained post-doctoral experience on early mouse development in the laboratories of Dr Magdalena Zernicka-Goetz (Gurdon Institute, Cambridge, UK), Dr Claire Chazaud (University of Auvergne, Clermont-Ferrand, Fance) and Dr Kat Hadjantonakis (Sloan-Kettering Cancer Center, NY), before returning to Professor Marilyn Renfree's laboratory (University of Melbourne) to study another marsupial – the tammar wallaby. His main interests lie at the intersection between early development, pluripotency and evolution in vertebrates (especially mammals). Much of his research in both mouse and marsupial has focused on the specification of the earliest pluripotent stem cell population in the embryo, as well as the early cell lineages that contribute to the placenta. He also specialises in the evolution of class V POU transcription factors, which have a central role in the regulation of pluripotency and early development in vertebrates.

James Peter Hill and the Australian Mammal Fauna: Monotremes and Marsupials in the Embryological Collection at the Museum für Naturkunde, Berlin

P. Giere
Museum für Naturkunde, Leibnitz Institute for Evolution and Biodiversity Science, Berlin, Germany

Monotremes and marsupials, these icons of the Australian fauna, are the mainstays of the Hill Collection and due to the wealth of the available material; they are frequently studied by scientists from all over the world. This collection was prepared and studied by James Peter Hill, a Scottish born zoologist based in Sydney at the turn of the last century. After initial training in Edinburgh and London, Hill went to Australia in 1892 to become a demonstrator in zoology at Sydney University – prior to formally having obtained even a bachelor's degree. There, he turned to study the local mammals and their reproductive biology, a topic that was greatly advanced by him and his collaborators. To obtain the necessary material, Hill and his mentor, J.T. Wilson, went on hunting expeditions to collect fresh material, especially of platypus, before Hill became Professor at University College, London. Having meticulously prepared the material, Hill transformed many specimens into serial sections. The value of this material is increased by the accompanying archival material with its catalogues, notebooks and photographs. This presentation will portray the Hill collection and its uses from a historical and current perspective and highlight the inherent links between Australia, the United Kingdom and Germany.

Dr Peter Giere

After studies as a biologist and a teaching degree in Marburg, Germany and Victoria, BC, Canada, Peter Giere joined the Museum für Naturkunde Berlin, initially to work on his PhD in mammal cranial development. This work got him in touch with the vast collections of the museum and elsewhere. After finishing his PhD in 2002, he remained at the Museum für Naturkunde, first as a researcher, later as the Curator of the Embryological Collection. Besides his curatorial tasks and research in mammal cranial morphology, Peter Giere is involved in various activities promoting the preservation of natural history collections. In this context, he has recently been appointed to be head of the Centre of Excellence Collections at the Museum für Naturkunde which currently is *in statu nascendi*. He is a member of the board of the *Gesellschaft für Biologische Systematik* as speaker of the curator's group of this society.

Ferdinand Mueller and the Making of Australian Botany: Using the Collections of Ludwig Leichhardt and Hermann Beckler

L.R. Gillbank
School of Historical and Philosophical Studies, University of Melbourne, Victoria 3010, Australia

The Colony of Victoria's government botanist was a collector-taxonomist. Ferdinand von Mueller collected plant specimens and documented the flora. In order to build a comprehensive Australian herbarium and, as he initially hoped, document Australia's flora, he welcomed specimens from his growing network of collectors. Some were Germans inspired by Alexander von Humboldt.

Ludwig Leichhardt and Hermann Beckler were two such Humboldt-inspired scientists. Both spent less than a decade in Australia and collected plant specimens behind and ahead of the European invasion frontier. Leichhardt travelled and collected before Mueller arrived in Australia in December 1847. His subsequent mysterious disappearance remained etched on Mueller's mind, not only during Mueller's participation in the 1855-56 North Australian Exploring Expedition (NAEE) and examination of Leichhardt's plant collections but also while documenting his NAEE collections. On learning that the NAEE botanist was 'ein Deutscher', Hermann Beckler contacted Mueller. Mueller supported Beckler's appointment as botanist to the 1860-61 Burke and Wills expedition and documented Beckler's plant collections.

Leichhardt's and Beckler's substantial plant collections were used to enrich plant taxonomy. Mueller used some specimens to name and describe new species. In his *Flora australiensis*, George Bentham did likewise with specimens that Mueller sent him. Thus both Leichhardt and Beckler contributed to the lexicon of Australian plant names.

Dr Linden Gillbank

An honorary fellow in Melbourne University's School of Historical and Philosophical Studies, Linden is an historian of science with a particular interest in Australian botany. Her research of nineteenth century botany includes Mueller's treks, collections and taxonomic work. *Burke & Wills: the scientific legacy of the Victorian Exploring Expedition* (CSIRO, 2011) includes her chapter on the botany of the expedition.

London-dispersion and Its Effects on Chemical Properties and Biomolecular Structures

L. Goerigk
School of Chemistry, University of Melbourne, Victoria 3010, Australia

Theoretical quantum chemistry, i.e., the description of the electronic structure of chemical systems by evoking the laws of quantum mechanics, has become an important field in chemical research. While years ago people may have associated this discipline with the treatment of “small, unimportant molecules in the gas phase”, better hardware architectures and methodological advances have made the *in-silico* evaluation of “real-life” problems more feasible.

In this talk, I will give a short overview of theoretical procedures developed in Germany[1,2] that allow the accurate and fast evaluation of van-der-Waals (London-dispersion) effects. These effects are ubiquitous and I will outline how they influence chemical reactions and structural properties. In particular, I will demonstrate how procedures describing these effects can be used in optimisations of protein structures. This can pave the way to intriguing future techniques such as quantum refinement of biomolecular X-ray structures, which ultimately connect quantum chemistry with structural biology.

1. S. Grimme, J. Antony, S. Ehrlich and H. Krieg, *J. Chem. Phys.* **132**, 154104 (2010).
2. S. Grimme, S. Ehrlich and L. Goerigk, *J. Comput. Chem.*, **32**, 1456 (2011).

Dr Lars Goerigk

Lars Goerigk is an ARC DECRA Fellow (2014-2017) in the School of Chemistry at the University of Melbourne. He studied chemistry at the University of Münster, Germany, but already, as an undergraduate student, he established ties with the Australian research community during a brief stay in the group of Professor Leo Radom (University of Sydney) in 2007. In April 2011, Lars completed his PhD with Professor Stefan Grimme in Münster. He then moved back to Australia on a postdoctoral scholarship funded by the Germany Academy of Sciences “Leopoldina” and worked in the group of Professor Jeffrey R. Reimers at the University of Sydney until March 2014. In April 2014, Lars joined the School of Chemistry at the University of Melbourne. Lars maintains collaborations with Leo Radom and Stefan Grimme, but he has also established new collaborations with Australian researchers at the University of Melbourne, La Trobe University and The University of Western Australia, and with German researchers at the University of Hamburg.

Lars’ area of expertise is Theoretical and Computational Quantum Chemistry, which is the description of electrons in chemical systems by evoking the laws of quantum mechanics, with special emphasis on method development and applications to bio-, inorganic- and organic-chemical problems. In particular, he has very recently become interested in the quantum-chemical description of protein and DNA structures. Lars has made decisive contributions in the development of one of the most accurate density functionals currently available (PWPB95) and he is also an expert in the theoretical description of London-dispersion effects. His expertise has been acknowledged with several research scholarships and prizes, the latest being the 2014 Selby Research Award by the Selby Scientific Foundation.

Sez6 Proteins are Important for Excitatory Synapse Development and Maintenance

K. Munro,[1] K. S.-L. Teng,[1] C.E. Eroglu,[2] N.L. Carrodus,[1] P.-H. Kuhn,[3]
S.F. Lichtenthaler[3] and J.M. Gunnersen[1]
[1] Department of Anatomy and Neuroscience, University of Melbourne,
Victoria 3010, Australia
[2] Duke University, Durham, NC, USA
[3] Technical University Munich (TUM), Munich, Germany

Development of appropriate neuronal circuitry is essential for learning, memory and cognition. The Seizure-related gene 6 (Sez6) protein is located in developing dendrites and dendritic spines and is required for normal dendritic arbor and excitatory synapse development of cortical pyramidal neurons. Neurons lacking Sez6 display aberrant dendritic branching and fewer excitatory synapses although it is not known whether excitatory synapses in Sez6 null mice fail to develop appropriately or are prematurely lost. We have analysed excitatory synapse formation *in vitro* and *in vivo* using constitutive and conditional Sez6 knockout mice and have used biochemical techniques to investigate Sez6 protein interactions and intracellular signalling. Our results indicate that secreted forms of Sez6 promote excitatory synaptogenesis by stabilizing developing synapses and that Sez6 is required in the mature brain to maintain excitatory synapses. These effects occur via calcium-dependent signalling pathways important for learning and memory and are likely to involve shedding of the Sez6 ectodomain by the Alzheimer's protease BACE1. We conclude that Sez6 proteins are not only important for excitatory synaptogenesis but that they are also required for maintaining functional excitatory circuitry. Therefore, BACE inhibitor drugs in current trials for Alzheimer's disease must be carefully evaluated for possible side-effects on excitatory synapses.

This work is funded by NHMRC Project Grants 1008046, 1058672 and a Go8-DAAD Australia–Germany Joint Research Co-operation grant for 2013/14.

Dr Jenny Gunnersen

Dr Jenny Gunnersen received her BSc (Hons) in Marine Biochemistry from James Cook University in 1986 and her PhD from the University of Melbourne in 1994. In her first post-doctoral position, she worked with Michael Sendtner in Würzburg, Germany, investigating trophic factors for motoneuron survival and regeneration. In 1998, Jenny was awarded an NHMRC Howard Florey Centenary Fellowship and joined Seong-Seng Tan in the Brain Development Group at the Howard Florey Institute. In this position, Jenny utilized emerging gene expression profiling techniques to obtain the first molecular inventory of the developing cortex. Using gene knockout mouse models, she has discovered important roles for some of the novel genes identified in the formation of synapses (the connections between neurons that are crucial for a functioning nervous system). In 2011, Jenny moved to the Department of Anatomy and Neuroscience at the University of Melbourne as a Senior Lecturer and Head of the Neuron Development and Plasticity Laboratory.

Crop Systems Biology: Towards Finding the Molecular Basis of Quantitative Traits in Bread Wheat

C.B. Hill,[1] J.D. Taylor,[2] J. Edwards,[3] D. Mather,[2,4] P. Langridge,[4] A. Bacic[5,6,7] and U. Roessner[1,5]

[1] Australian Centre for Plant Functional Genomics, School of Botany, University of Melbourne, Victoria, Australia

[2] School of Agriculture, Food and Wine, University of Adelaide, South Australia, Australia

[3] Australian Grain Technologies, Roseworthy, South Australia, Australia

[4] Australian Centre for Plant Functional Genomics, University of Adelaide, South Australia, Australia

[5] Metabolomics Australia, School of Botany, University of Melbourne, Victoria, Australia

[6] Bio21 Molecular Science and Biotechnology Institute, University of Melbourne, Victoria, Australia

[7] ARC Centre of Excellence in Plant Cell Walls, School of Botany, University of Melbourne, Victoria, Australia

Progress in wheat breeding to improve complex multigene traits, such as drought stress tolerance, has been limited by high sensitivity to environmental factors, low trait heritability, and the complexity and size of the hexaploid wheat genome. To obtain further insight into genetic factors that affect yield under drought, we measured the metabolic profile of a mapping population from a cross between drought-sensitive and drought-tolerant wheat cultivars grown in the field under terminal drought stress. Additionally, a large number of agronomic traits from the initial field experiment were evaluated, including grain yield as an indicator of drought tolerance. A linear mixed model was used to partition and account for non-genetic and genetic sources of variation, and quantitative trait locus analysis was performed. Our analyses identify specific combinations of metabolites as potential biomarkers for the performance of wheat under drought, as well as important regions on the wheat genome associated with the drought response. Previous results that demonstrate the importance of including plant phenology in the assessment of useful traits were reinforced. This approach proved valuable for identifying novel biomarkers for the performance of wheat under drought stress and could facilitate the identification of candidate genes involved in drought-related responses in wheat.

Dr Camilla B. Hill

Dr Camilla Hill graduated from the Free University (Berlin, Germany) with a Master's degree in Biology in 2008. To accomplish the laboratory work for her thesis in plant molecular biology, she went to the Washington State University in Pullman (WA, USA) on a DAAD fellowship (German Exchange Academic Service). She moved to Melbourne (Australia) in 2010 to start a Ph.D. at the ACPFG (Australian Centre for Plant Functional Genomics), under the supervision of Professor Antony Bacic and Associate Professor Ute Roessner. She applied metabolomics as a new tool to identify drought tolerance-related QTL in a wheat mapping population, and also worked on a project regarding plant salinity tolerance in collaboration with researchers from the Adelaide node of the ACPFG. She continues to work as a post-doctoral researcher at Associate Professor Ute Roessner's laboratory in Melbourne, and also studies part-time at the University of Melbourne to earn a Graduate Certificate in University Teaching. Her research is currently focused on the development of a multidisciplinary functional genomics approach using a combination of physiological, molecular, and analytical techniques to identify novel salinity tolerance mechanisms in barley.

Quantum Reality Bytes – The Dawning Age of Quantum Information Technology

L.C.L. Hollenberg
Centre of Excellence for Quantum Computation and Communication Technology
University of Melbourne, Victoria 3010, Australia

Quantum Mechanics is the corner-stone theory of the physical world, which began with the ideas of Max Planck over a century ago. In recent years new and surprising aspects about quantum mechanics, and reality itself, have been uncovered as experiments probe further into the quantum realm. While we do not (and possibly cannot!) fully comprehend the sublime strangeness of quantum mechanics, a growing movement around the world seeks to harness the awesome processing power of microscopic systems obeying quantum laws. This is an international race for the new millennium to design and build novel technology based on the spookier aspects of quantum mechanics, with enormous potential for communication, computing and imaging applications. Already quantum sensing of biological processes is becoming a reality, and ultra-secure quantum communication systems are being rolled-out around the world. The far-flung future of this new quantum technology is the construction of a full-scale quantum computer, potentially a leap forward in information processing far greater than the development of the modern computer. In this talk I will look at emerging quantum technology based on single spins in silicon and diamond, with applications in quantum computing and quantum sensing.

Professor Lloyd Hollenberg

Professor Hollenberg completed his PhD in 1989 at the University of Melbourne in theoretical particle physics and was subsequently awarded a fellowship from the Japanese Society for the Promotion of Science (JSPS) to work at the KEK National Accelerator Laboratory in Tsukuba, Japan. In 1991 he returned to take up a position in the School of Physics, University of Melbourne. He also spent extended periods in Germany as an Alexander von Humboldt Fellow at the Max Planck Institute for Nuclear Physics, Heidelberg (1999) and at the University of Munich (2005). In 2000, Professor Hollenberg joined the ARC Centre of Excellence (CoE) for Quantum Computing Technology (now the CoE for Quantum Computation and Communication Technology (CQC^2T), of which he is Deputy Director) and has been a driving force of the silicon quantum computer vision. Professor Hollenberg has published over 170 papers in refereed journals, including prestigious journals such as *Science*, *Nature*, *Nature Physics*, *Nature Nanotechnology*, *Nature Materials*, *Nature Communications*, *Proceedings of the National Academy of Sciences* and *Physical Review Letters*. He is a well-known proponent of quantum technology in the wider context, having also worked on quantum communication systems as Technical Director of the Quantum Communications Victoria initiative (2005-2008), and on developing ultra-sensitive quantum sensing and imaging techniques crossing over to the nano-bio realm. He was awarded the 2012 Walter Boas Medal and the 2013 Victoria Prize (physical sciences), and led the team that won the 2013 Eureka Prize for Excellence in Interdisciplinary Research. For the period 2007-2011 Professor Hollenberg held an ARC Professorial Fellowship, and was recently awarded an ARC Laureate Fellowship (2013-2018) to work on quantum sensing applications in biology.

Ferdinand Mueller and the Royal Society of Victoria

R.W. Home
School of Historical and Philosophical Studies, University of Melbourne,
Victoria 3010, Australia

Among the most prominent members of the Royal Society of Victoria in its earliest years and of its predecessor organization, the Philosophical Institute of Victoria, were a number of Germans. These included the Government Botanist, Ferdinand Mueller, the only person in Victoria at the time who had international standing as a scientist. Mueller was very active in the Society for several years, and was its president at the time it received its Royal Charter during probably the most momentous year in its history. Not long after this, however, he seems to have largely withdrawn from the Society and to have played almost no role in its affairs for many years. In this paper I discuss Mueller's contribution to the Society, his changing relationship with it, and the vital role it played in the unfolding of his career.

Professor Rod Home AM

Rod Home was Professor of History and Philosophy of Science at the University of Melbourne, 1975-2003, and is now Emeritus Professor. He has published widely on the history of physics, especially in the eighteenth century, and on the history of Australian science. He has been editor (and more recently co-editor) of the journal *Historical Records of Australian Science* since 1984, and leads the international project that is preparing a comprehensive edition of Ferdinand Mueller's massive surviving correspondence. He is a Fellow of the Australian Academy of the Humanities and a member of the International Academy of the History of Science.

‘Collecting Systematically’: Hermann Beckler and the Making of an Australian Botanical Collector

S. Jeffries
(Previously) German Department, Monash University, Clayton, Victoria 3800, Australia

Hermann Beckler (1828-1914) is known as the botanist and doctor who accompanied the Burke and Wills exploring expedition. But how did Beckler come to collect for Ferdinand von Mueller? Letters forwarded to his brother, Karl, in Bavaria between 1856 and his departure for Melbourne in 1859, document in detail the stages by which he became a serious botanical collector. Paradoxically, his failure to establish a medical career opened up the opportunity for him to pursue his interest in the Australian flora after he settled in Warwick at the end of 1857. At first, without scientific support or adequate botanical reference material, encouragement from the Parramatta-based collector William Woolls led Beckler to collect a wide and diverse range of botanical specimens. Repeated requests to collect to Beckler from Ferdinand Mueller who had been informed of his interest by Woolls, resulted in his decision in January 1859 to travel overland to meet Mueller. The influence of Alexander von Humboldt is evident in Beckler’s enthusiasm for the Australian flora and in his systematic and scientific approach to collecting and exploration. Driven by curiosity, he aimed to identify those plants native to the temperate and sub-tropical zones unfamiliar to him in eastern Australia.

Dr Stephen Jeffries

The author has a long-standing interest in German Australiana. He translated Hermann Beckler’s narrative, *Burke’s Expedition. A journey to Central Australia* as *A Journey to Cooper’s Creek* for the State Library of Victoria in 1993. Together with Leslie Bodi and Susan Radvansky, he published *Image of a Continent: A Bibliography of German Australiana from the Beginnings to 1975* in 1990. He has also written about Humboldt’s influence on Ferdinand von Mueller. At present he is researching German speaking scientists who emigrated from central Europe to Melbourne in 1938 and 1939.

German Science in Nineteenth-Century Australian Libraries

W. Kirsop
School of Languages, Literatures, Cultures and Linguistics, Monash University,
Victoria 3800, Australia

Despite the outstanding role played by German-speaking scientists in nineteenth-century Australia, it is an open question whether the publications of their home countries were adequately held in the libraries of the various colonies. Between Bligh's disdain for Robert Townson's books at the beginning of the century and C.W. Holgate's 1886 commentary on the collections of the Melbourne Public Library, there is evidence of deficiencies in the holdings of material derived from the German states and from the Austrian Empire. This needs to be tested by sampling of the available printed catalogues of universities, public libraries, mechanics' institutes and research bodies during the period. Book and library historians have evolved methods for this sort of assessment and these can fruitfully be applied in the present case. In turn this touches on wider problems of cultural affiliations for the colonists. Given the diversity of origins one can note for the different settlements, it is not surprising that the overall picture is a mixed one.

Professor Wallace Kirsop

Wallace Kirsop is an Adjunct Professor in the School of Languages, Literatures, Cultures and Linguistics at Monash University, where he taught French from 1962 to 1998. He is also an Honorary Fellow of the Baillieu Library at the University of Melbourne. Since 1980 he has been a Fellow of the Australian Academy of the Humanities. His research chiefly concerns physical bibliography and book history, with a divided emphasis on France from the sixteenth to the nineteenth century and on Australia before Federation. Among his publications are *Towards a History of the Australian Book Trade* (Sydney, Wentworth Books, 1969) and *Books for Colonial Readers - The Nineteenth-Century Australian Experience* (Melbourne, BSANZ, 1995).

Myelin Regulatory Factor as a Key Regulator of Oligodendrocyte Differentiation and Myelin Maintenance

M. Könning,[1] H. Bujalka,[1] S. Jackson,[1] V.M. Perreau,[2]
M. Willingham,[1] T.J. Kilpatrick[1,2] and B. Emery[1,2]
[1] Department of Anatomy and Neuroscience, University of Melbourne,
Victoria 3010, Australia
[2] Florey Institute of Neuroscience and Mental Health, Melbourne, Victoria 3052, Australia

The rapid and energy-efficient conduction of signals in the brain and spinal cord is aided by myelin, an insulating substance that surrounds axons in concentric layers. These myelin sheaths are produced by oligodendrocytes, cells highly specialised in the support of neurons. Loss of oligodendrocytes and myelin in diseases such as Multiple Sclerosis (MS) results in debilitating motor and sensory deficits. Frequently, MS tissue contains oligodendrocyte progenitor cells that fail to mature and remyelinate nearby axons. Therapeutic approaches to overcome this block of maturation will require the characterization of key regulators of oligodendrocyte maturation and myelination.

The gene “Myelin Regulatory Factor” (MyRF) is required for the generation of myelin during development. Here we investigate whether MyRF also is required on an ongoing basis for the maintenance of myelin in the adult. Behavioural tests, immunohistochemistry and electron microscopy indicate that MyRF ablation in adulthood results in severe demyelination. Using in-silico analysis and site-directed mutagenesis, we find that MyRF needs to be activated through a critical cleavage event before it can promote myelin gene expression. These results demonstrate that MyRF is a transcription factor of importance for both the generation and maintenance of myelin and give a new potential point of therapeutic intervention.

Mr Matthias Könning

Matthias Könning is currently undertaking his PhD in Neuroscience at the Department of Anatomy and Neuroscience of the University of Melbourne. His research interests include elucidating the molecular events that mediate communication between cells in the central nervous system. In an interdisciplinary approach his research combines neuroscience methods with biochemistry techniques drawing on a Master of Science in Biochemistry from the Technical University of Munich. His research has been published in international peer-reviewed journals such as *Journal of Neuroscience* and *PLOS Biology*. Matthias is a member of the International Society of Neuroscience, and their travel support and the Graduate House Research Scholarship 2012 allowed for the presentation of the work at various national and international conferences such as the Australian Neuroscience Societies Annual Meeting, the Federation of Neuroscience Societies Biennial Meeting and the Gordon Myelin Conference.

William Brahe and Julius Lohmeier: Unsung Heroes of the Burke and Wills Expedition

F.J. Leahy
School of Engineering, University of Melbourne, Victoria 3010, Australia

William Brahe was born in Paderborn, Germany, on 16 January 1835 and emigrated to Australia in 1852. In the years before joining the Burke and Wills Expedition in 1860, he worked as gold digger, carrier and overland drover - his reputation as a skilled wagon driver probably earning him the appointment. He was well known to the German society in Melbourne, his brother W.A. Brahe being the German consul and the meteorologist/geophysicist Georg von Neumayer supplying a letter of recommendation to go with his application to join the expedition.

But it comes as a surprise that this knock-about bushman played a role in the scientific endeavours of the Burke and Wills Expedition. Against his will, he was chosen to remain in charge of the depot on Cooper Creek while Burke, Wills, King and Gray made a dash 1000 kilometres north to the Gulf of Carpentaria. Brahe was selected as he was capable of "using the compass" and, in case of disaster, could lead a retreat to the settled districts. Wills, the expedition's navigator/astronomer, trained Brahe to continue the meteorological observations. This he did assiduously for the following four months. But, with supplies running low, party members sickening and convinced that the long-overdue Burke would not return to the depot, Brahe withdrew – unfortunately only hours before the remnants of Burke's northern party staggered back to the depot. Brahe's performance on the expedition should have been regarded as heroic but with the subsequent deaths of Burke, Wills and Gray, the perception of the Melbourne's *hoi polloi* was quite the opposite. His return to Melbourne was met with opprobrium and letters to the newspapers included the words "desertion" and "cowardly."

The accuracy of Wills' navigation was extraordinary – in no small degree due to the precision of his sextant. There is evidence it may have been manufactured by Julius Lohmeier of Hamburg and brought to Melbourne by von Neumayer. On the agonising return from the Gulf of Carpentaria, the camels used for transport failed and the astronomical instruments had to be abandoned. In the hope of later recovery, Wills buried these at a site shown on his chart as "Plant Camp", some 100 kilometres short of the depot. At this site in 2007, artefacts seemingly associated with the expedition, were found. Amongst these were fragments that appear to be from a sextant.

This paper summarises the significance of Brahe's meteorological records and argues that the public's perception of his behaviour was erroneous, caused by a blinkered view and a misinterpretation of the evidence. The proposal is made, that if a sextant manufactured by Lohmeier in the 1850s can be located and the fragments are found to match, closure maybe reached on the Plant Camp site itself and the provenance of Wills' sextant.

Dr Frank Leahy

Frank Leahy retired from the Department of Geomatics, University of Melbourne in 2006 after 40 years of lecturing and research in geodesy. As a diversion, and when time permitted, he investigated possible sites of the Burke and Wills Expedition camps. The search was based on an analysis of Wills' navigational records and a re-working of his positional astronomy observations. The project culminated in the likely location of the Plant Camp – the site where Wills cached his astronomic instruments.

Triple Jeopardy in the Tropics: Assessing Extinction, Risk and Diversity in Western Australia's Freshwater Biodiversity Hotspot

M. Le Feuvre,[1] J. Shelley,[1] S. Swearer,[1] T. Dempster[1] and M. Gomon[2]
[1] Zoology Department, University of Melbourne, Parkville, Victoria, Australia
[2] Museum Victoria, Carlton, Victoria, Australia

Freshwater ecosystems are under threat globally from habitat destruction, salinisation, pollution, invasive species and climate change. As a result, many freshwater species are threatened with extinction. Species with small ranges, small population sizes and narrow ecological niches are thought to be subject to a “triple jeopardy” risk of extinction.

Within Australia, 20% of freshwater fish species have conservation listings from the Federal Government. The Kimberley bioregion is a hotspot of freshwater fish biodiversity, with 50 freshwater fish known from the region, and 17 endemic species. The endemics are highly range-restricted; many are known from one collection location, with minimal corresponding ecological data. Thus, their conservation status is unknown. In addition, due to the paucity of surveys in the region, diversity may be underestimated. Using the “triple jeopardy” framework, I will compare range-restricted endemics and widespread congeneric species that co-occur and quantitatively assess their extinction risk. I will present my range size and abundance results from six months of field work in the Kimberley region, and preliminary results of the degree of specialisation in Kimberley fish species. Following in the footsteps of Germanic fish taxonomists in Australia, we have uncovered over ten new species of freshwater fish, which I will discuss.

Mr Matthew Le Feuvre

With a childhood filled with David Attenborough documentaries and holidays in wild and wonderful places, it was only natural that I ended up as an ecologist. With majors in marine biology and zoology during undergraduate studies, I continued into honours and further research investigating temperate fish ecology on both natural and artificial reefs in Victoria. I then took a sidestep when I moved to central Australia for a couple of years to work as an environmental consultant. Missing both water and fish but loving the wide open spaces of remote Australia, I returned to the Zoology Department at the University of Melbourne for my PhD project and now enjoy the best of both terrestrial and aquatic worlds studying extinction risk in the freshwater fishes of the stunning Kimberley region.

Lamont's Seed – Georg von Neumayer's Interest in Magnetism, Meteorology and Astronomy

C. Lüdecke
Center for History of Science and Technology, University of Hamburg, Hamburg, Germany

From 1835, Johann von Lamont (1805-1879) was director of the observatory at the village of Bogenhausen north east of Munich (today part of Munich). He was a scholar with varied interests and abilities to achieve something excellent with sparce funding. Although he started his astronomical research with a brand new Fraunhofer refractor, he had to work with even older instruments until his death in 1879. For instance he used a Reichenbach meridian circle not only to determine the positions of more than 37,500 stars but also to determine the exact time at noon. He was involved in the project of the European arc measurement. However, his main interest changed to magnetic measurements and subsequently his observatory became one of the first magnetic stations in Europe. Lamont also started a Bavarian and European magnetic survey. Further, he intensified the meteorological observations in 1840 with the aim to expand the observatory to the meteorological centre of the Kingdom of Bavaria. He analysed the various data sets collected and published his results in the *Astronomischer Kalender für das Königreich Bayern* (1850-1953) and the *Annalen der Königlichen Sternwarte bei München* (1848-1876). Due to financial restrictions Lamont had established a workshop for precision engineering in his observatory, where he invented and constructed new instruments. Especially his magnetic travel-theodolite became the instrument for expeditions and magnetic stations to be used world-wide. In 1849 his magnetic work culminated in the publication of a textbook on earth magnetism.

At this time, Georg von Neumayer (1826-1909), studying mathematical and physical sciences at the Polytechnical School and Engineering School in Munich, read the reports of James Clark Ross' (1800-1862) successful expedition in search for the magnetic pole in the southern hemisphere. This laid the foundation to Neumayer's interest in a German expedition to the still unknown Antarctic region and the investigation of the magnetic field of the earth. After his final exam he had practical training with Lamont during winter 1849/50, when the astronomer was one of the leading experts in earth magnetism. During their discussions, Neumayer learnt a lot about Lamont's different interests and how he dealt with them. Although he only stayed a few months at the observatory, Lamont's input determined Neumayer's future life as a scientist, with respect to the construction and calibration of instruments, astronomical observations and timing, as well as magnetic and meteorological measurements, magnetic surveys and the importance of the publication of the results in annual volumes. When Neumayer decided how to follow his career, his main aim was to continue Ross' magnetic measurements in the south-polar region. A starting point was Hobart, where Ross had set up a magnetic observatory, which functioned from 1841 to 1849. However, a station at Melbourne seemed more suitable for Neumayer to serve as a base station for magnetic investigations of Antarctica.

When Neumayer established the Flagstaff observatory for Physics of the Earth at Melbourne in 1857, he followed the ideas of his scientific mentor Lamont in all aspects concerning measurements at the observatory including a magnetic survey of Victoria. When he returned to Germany in 1864, he promoted the observation of the transit of Venus in 1874 and 1882 in the southern hemisphere, the importance of which he had also learnt from Lamont.

In the end, Neumayer made a wrong decision, because instead of Melbourne, Hobart became the Australian gateway to Antarctica. However his legacy in Australian earth-magnetism and meteorology is unforgotten.

Privatdozent Dr habil. Cornelia Lüdecke

Cornelia Lüdecke has a diploma in meteorology and a PhD in History of Natural Sciences from the Ludwig Maximilians University in Munich. In 2002 she finished her second thesis (Habilitation) at the University of Hamburg and was given the title “Privatdozent” in the following year. Since then she has taught about the history of earth-sciences in Hamburg. In addition, she is head of national groups on history of meteorology and polar research and she has organised many national and international workshops or conferences on both topics.

She was Vice-President (2001-2005) and then President (2006-2009) of the International Commission on History of Meteorology. Since 2012 she has been Vice-President of the International Commission on History of Oceanography. In 2004 she founded the Expert Group on History of Antarctic Research within the Scientific Committee on Antarctic Research. She has published 13 books and proceedings and over 160 papers. In 2010 she received the Reinhard Süring Medal from the German Meteorological Society and in 2012 she was elected as corresponding member of the International Academy of the History of Science in Paris.

Atom Probe Tomography: 3D Chemical Analysis with Near-Atomic Spatial Resolution

R.K.W. Marceau
Institute for Frontier Materials, Deakin University, Geelong, Victoria 3216, Australia

The challenge in characterising atomistic-level structures is that it pushes the limits of both spatial resolution and chemical sensitivity of most microscopy and microanalysis techniques. Atom probe tomography (APT) is uniquely positioned to provide 3D imaging, sub-nanometre spatial resolution, and quantitative compositional information enabling differentiation between all the elements of the periodic table and their respective isotopes.[1]

In 2013, a local electrode atom probe (LEAP 4000HR) instrument from CAMECA Instruments was installed at the Institute for Frontier Materials (IFM) at Deakin University, Geelong Waurn Ponds campus. The new atom probe is the 50th LEAP to be installed around the world and offers unparalleled insight into the nanostructure of materials. Recent work on understanding the fundamental processes of carbon redistribution in modern steels will be highlighted, providing new insights into microstructure-property relationships.

1. B. Gault, M.P. Moody, J.M. Cairney and S.P. Ringer, *Atom Probe Microscopy* (New York: Springer, 2012).

Dr Ross Marceau

Ross is a research academic and manager of the LEAP 4000HR atom probe instrument at the Institute for Frontier Materials, Deakin University. He holds a Bachelor of Engineering (Materials) with First Class Honours obtained from The University of New South Wales in 2004, together with a PhD from The University of Sydney. After completion of his PhD in 2008, Ross became a research associate of the Australian Research Council Centre of Excellence for Design in Light Metals within the Australian Centre for Microscopy and Microanalysis at The University of Sydney (2008–2011). Prior to starting at Deakin University in July 2013, Ross was awarded an Alexander von Humboldt Postdoctoral Fellowship to conduct research at the Max-Planck-Institut für Eisenforschung (Max Planck Institute for Iron Research) in Düsseldorf (Germany) between 2011 and 2013. Ross's research focuses on design of metallurgical materials (e.g. aluminium and magnesium alloys, steels, intermetallic and bulk metallic glass systems, etc.) by understanding atomic-scale microstructural phenomena relating to materials properties and performance. He has significant expertise in the field of atom probe tomography and various electron microscopy techniques.

From Economic Botany to Ecology: Ferdinand Mueller's *Select extra-tropical plants readily eligible for industrial culture or naturalisation*, 1871–1929

S. Maroske
Royal Botanic Gardens Melbourne, South Yarra 3141, Australia
Fenner School of Environment and Society, Australian National University, Canberra 0200, Australia

Scholarship in the emerging field of science and empire has been in the forefront of recognizing the contribution of colonial natural science to the development of ecological thinking. Ferdinand Mueller's manual on economic botany, *Select extra-tropical plants*, is an under appreciated example of this process. First published in a series of articles in the British colony of Victoria in the 1870s, the German-born Mueller's manual combined information on the origins, adaptability and uses of Australian and overseas plants suitable for 'industrial culture' or 'naturalisation' in regions with an 'extra-tropical' climate. Over the next fifty years, the manual appeared in twelve book editions which record the development of Mueller's thinking about economic botany, and the emergence of his awareness of what would become key features of twentieth century ecology. These include the importance of human agency in environmental change, the idea of the fragility of the environment, and an expanded definition of a weed. Mueller's manual was published in six countries, including France, the USA and India, and in four languages, including German and Portuguese, which gave it an international reach. In obituaries after Mueller's death in 1896, the manual was regarded as one of Mueller's most important and influential achievements.

Dr Sara Maroske

Sara Maroske is an historian of Australian science with links to the Royal Botanic Gardens Melbourne, the Fenner School of Environment and Society at the Australian National University, and the School of Land and Environment at the University of Melbourne. As one of the team of international scholars responsible for publishing the correspondence of Baron Ferdinand von Mueller, and co-author of a forthcoming biography of Mueller, she is well placed to present information on the latest findings about Australia's most famous nineteenth-century scientist.

The German Contribution to the Founding of the Royal Society of Victoria

D. McCann
Royal Society of Victoria

The German community of early Melbourne was proudly supportive of, and profoundly influential in, the establishment of the Royal Society of Victoria in 1859, and in the beginnings of organised science in the colony of Victoria. Indeed, the German community had also been greatly involved in the formation of the precursor societies to the Royal Society several years earlier, in 1854. Nearly all of the main German contributors arrived in Melbourne in the early 1850s as part of a massive migration of people to Victoria following the official discovery of gold in 1851. Some of the émigrés who rose to prominence include William Blandowski, Ferdinand Mueller, Ludwig Becker, Georg Neumeyer and Eugene von Guérard. In addition, many lesser-known figures also made a significant contribution. It could be argued, in fact, that the establishment of the Royal Society of Victoria was predominantly a German initiative. Most of these expatriate German citizens paid tribute to the inspiration of Alexander von Humboldt in their desire to travel and explore new lands – new, at least, to Europeans – and to study scientifically, document and collect specimens as part of an international cooperative effort to document all domains and diverse aspects of the planet. Within a decade this seminal German influence began to fade as the Anglo-Irish-Scottish establishment forcefully asserted a hegemonic grip on government and local administration, and progressively excluded other nationalities, and even the Indigenous inhabitants.

Dr Doug McCann

Doug McCann is a science historian and was for a decade a councillor of the Royal Society of Victoria. He is co-author of *The last of the first. CSIRAC: Australia's first computer* and more recently co-editor and co-author of *Burke & Wills: the scientific legacy of the Victorian Exploring Expedition.* He has lectured and tutored in Darwinism, History of Astronomy and History of Technology at the University of Melbourne, Swinburne University of Technology and Deakin University.

Malaria: The Plant Connection

G.I. McFadden
School of Botany, University of Melbourne, Victoria 3010, Australia

Malaria is a major global health problem. The World Health Organization estimates that 500 million are infected and 1 million people die each year. There is currently no vaccine and the parasite is now resistant to most of our existing drugs. Our research has recently revealed that the malaria parasite was originally a plant-like organism that survived by photosynthesis. We find major genetic traces of a plant-like metabolism in malaria parasites. This tells us that the parasite moved from its life in the ocean as a unicellular plant to a new, parasitic lifestyle eating the blood in our veins. Importantly, this revelation offers us new ways to combat the disease using drugs and herbicides initially designed to kill plants. Our team has identified many new drug targets in the relict plastid of malaria parasites, vastly increasing the number of strategies for the development of much needed new malaria drugs.

Professor Geoffrey Ian McFadden FAA

Geoff McFadden took a BSc (Hons) and PhD at the University of Melbourne. He made two trips to Antarctica, worked for three-years in Münster, Germany and had a post at the Institute for Marine Biosciences in Halifax, Canada. He has worked on all six continents as a marine biologist, botanist or parasitologist. Geoff is now a Professor in the School of Botany, University of Melbourne.

Geoff discovered that malaria parasites are closely related to plants and algae by identifying and characterising the apicoplast of malaria and *Toxoplasma*. He set up Australia's first malaria life cycle facility and insectary to investigate drug targets and vaccine strategies. Geoff is convener and founder of the Ozemalar, the Australian European Malaria Research Network, which funds research exchanges between 47 Australian malaria labs and their European collaborators. He has published 216 scientific papers, many in high profile journals such as *Nature*, *Science*, *EMBO J*, and *PNAS*. His papers have accumulated in excess of 14,000 citations, his *h*-index is 60, and he is ranked in the 98th percentile of the 3 million subscribers to ResearchGate. Geoff has been awarded the Goldacre Medal, the Australian Academy of Science's Frederick White Prize, two Howard Hughes Medical Institute Scholar's awards, The David Syme Medal from *The Age*, the Woodward Medal for Excellence in Science & Technology, the Julian Wells Medal, the Miescher-Ishida Prize, The Royal Society of Victoria Research Medal, The Ramaciotti Medal, an ARC Federation Fellowship, and is a member of the Australian Academy of Sciences. Geoff's interests include surfing, making wooden surfboards, and restoring 1950s American cars.

Noted Colonial German Scientists and Their Contexts

G.L. McMullen
Mary Aikenhead Ministries, Bondi Junction, NSW 2022, Australia

German scientists made a significant and impressive contribution to colonial Victoria. They were involved in the establishment of some of the major public institutions, e.g., the Royal Society of Victoria, National Herbarium, the Royal Botanic Gardens, Museum Victoria, the Flagstaff Observatory for Geophysics, Magnetism and Nautical Science, the Pharmaceutical Society of Victoria and the Victorian College of Pharmacy. Further, they played a leading role not only in scientific and technological developments but also in exploration – Home has identified "science as a German export to nineteenth century Australia".[1] Significantly, an account of the 1860 annual dinner of the Royal Society of Victoria related the following comment from Dr John Macadam, Victorian Government Analytical Chemist and later Health Officer for the City of Melbourne: "Where would science be in Victoria without the Germans?"[2] The paper will consider key German scientists working in mid-19th century Victoria and the nature of their contributions to the Colony.

1. R Home (1995) `Science as a German Export to Nineteenth Century Australia', *Working Papers in Australian Studies*, No. 104, T Griffiths and D Lowe (eds) (London: Sir Robert Menzies Centre for Australian Studies), 1-21.
2. *Melbourner Deutsche Zeitung*, 32 (13 April 1860), 192.

Professor Gabrielle McMullen AM

Following postdoctoral research in Germany with an Alexander von Humboldt and then a Deutsche Forschungsgemeinschaft Fellowship, Gabrielle McMullen AM FRACI BSc (Hons) PhD (Monash) joined the Department of Biochemistry at Monash University and also became Dean of the Catholic residence, Mannix College, in 1981. She was then Rector of Australian Catholic University's (ACU) Ballarat campus from 1995-2000 and its Pro- and then Deputy Vice-Chancellor (Academic) until February 2011. Her community contributions have encompassed membership of education, health, theological and welfare boards. In July 2011 she was appointed a Trustee of Mary Aikenhead Ministries, which has been established by Sisters of Charity of Australia to continue their health and aged care, education and welfare ministries. A member of the Australian Catholic Council for Pastoral Research, her personal research interests include Catholic identity and mission, and the history of science. She is currently President of the Australian Association of von Humboldt Fellows.

Modelling Metal Transport in the Deep Earth Using Supercomputers

Y. Mei,[1] J. Brugger,[1] W. Liu,[2] A.E. Williams-Jones[3] and A.A. Migdisov[4]
[1] School of Earth, Atmosphere and Environment, Monash University, Clayton, Victoria 3800, Australia
[2] CSIRO Earth Science and Resource Engineering, Clayton, Victoria 3168, Australia
[3] Earth and Planetary Sciences, McGill University, Montreal H3A 2A7, Canada
[4] Earth and Environmental Sciences Division, Los Alamos National Laboratory, NM 87545, USA

Metals are transported within the deep Earth at high pressure and temperature by fluids possessing a complex chemical makeup. Over the past 20 years, many observations and experimental studies have highlighted the role of low-density fluids and phase separation in the formation of ore deposits that are responsible for Australia's mineral wealth. Metal solubility in vapours is a consequence of the complexation by ligands such as H_2O, H_2S and HCl. Knowledge of the identity, stoichiometry and thermodynamic properties of metal complexes is thus essential for modelling the dissolution, transport and deposition of metals in the vapour phase.

This study takes advantage of recent advances in high performance computing to perform state-of-the-art, first-principles, molecular-dynamics simulations on metal solubility from dense fluids to vapours, and in particular, the partitioning of metals in boiling systems. The simulation results give molecular-level insights into the chemical and physical factors that affect metal (i.e., Au, Cu, Zn, Pd, Mo) transport and deposition in ores over a wide range of temperature, pressure and fluid composition. By demonstrating the value of computational chemistry methods to mineral exploration, this study reveals the development of new exploration models and contributes to sustaining Australia's leadership in the minerals industry.

Dr Yuan Mei

Dr Yuan Mei completed her first degree in Applied Chemistry in East China University of Science and Technology (ECUST) in 2007. After a few years' postgraduate study in ECUST, she started a PhD in geochemistry in the University of Adelaide in 2010. During her PhD, she has visited the University of Bristol (UK) and Johannes Gutenberg-Universität Mainz (Germany) for collaborations. Dr Mei was granted the PhD degree from the University of Adelaide in 2013. She then started working as a Research Fellow in Adelaide and moved to Monash University in April 2014. Dr Mei was involved in the Humboldt-Network as an Early Career Researcher in October 2013 in the Humboldt Colloquium "Looking to the Future: International Research in a Changing World". Dr Mei's research focuses on understanding the metal behaviour in ore-forming fluids by molecular modelling. She also uses state-of-the-art synchrotron techniques to investigate the metal complexation and thermodynamic properties.

Life in the Pouch: A Window into Development

B.R. Menzies, J. Hetz, G. Shaw and M.B. Renfree
Department of Zoology, The University of Melbourne, Victoria 3010, Australia

Large, iconic marsupials such as kangaroos and wallabies are excellent models for investigations of growth and development because they give birth to tiny young that complete the remainder of their development in a handy *cul de sac*, the pouch. The tammar wallaby has a highly predictable reproductive pattern that enables the generation of multiple young of the same chronological age. If groups of young are generated at discordant ages and then fostered to mothers at later stages of lactation, when the milk is more nutritious, we see a dramatic acceleration of pouch young growth.

Here we describe the changes in endocrinology seen in 60-day-old tammar wallaby pouch young transferred to mothers at day 120 of the lactation cycle. Our results show clearly that nutrition dictates the pace of growth by stimulation of potent growth factors in developing pouch young tissues. Thus, the size and diet of mothers can directly affect the speed of development of their young. Given the current obesity epidemic, these findings have implications for human mothers as to the optimal growth rate during early life and the health and longevity of their babies.

A Centenary Fellowship from the University of Melbourne to B.R. Menzies supported this work.

Dr Brandon Menzies

I completed my PhD on the endocrinology of growth in the tammar wallaby and then received a post-doctoral position at the Leibniz Institute for Zoo and Wildlife Research in Berlin. I was subsequently awarded an Alexander von Humboldt Post-Doctoral Fellowship to investigate the genetic diversity of the extinct Tasmanian tiger using tissue from deceased museum specimens. I currently hold a Centenary Fellowship in the Department of Zoology at the University of Melbourne and have an Early Career Researcher Grant to investigate the influence of nutrition on endocrinology and growth using the tammar wallaby model described above. My research interests include all aspects of comparative reproduction, growth and development in mammals.

Erhard Eylmann in Australia

P. Monteath
School of International Studies, Flinders University, GPO Box 2100, Adelaide SA 5000

The medically-trained German anthropologist Dr Erhard Eylmann travelled extensively in Australia in the late nineteenth and early twentieth centuries. Most of his fieldwork was conducted in South Australia, which at that time, included the Northern Territory. Eylmann's major published achievement was his book *Die Eingeborenen der Kolonie Südaustralien* (*The Aborigines of the Colony of South Australia*, 1908), though in a number of shorter works Eylmann pursued interests in other disciplines.

This paper offers an assessment of Eylmann's contribution to anthropological knowledge in Australia. In doing so it draws on his major work and his notebooks, the originals of which are located in the *Überseemuseum* in Bremen. It considers how his understanding of the discipline was shaped by his medical training and his perception that anthropology was a natural, empirical science. This set Eylmann at odds with German missionaries in Australia, whose work he criticised, and yet whose hospitality he depended on in gaining prolonged access to Indigenous people. On the other hand, Eylmann's views on anthropology did strike a chord with Baldwin Spencer in Melbourne and Francis Gillen in Alice Springs, who were similarly sceptical of German missionary endeavours.

Associate Professor Peter Monteath

Peter Monteath is an Associate Professor in History in the School of International Studies at Flinders University in Adelaide. He is also a Fellow of the Alexander von Humboldt Foundation. He has degrees from The University of Queensland (BA Hons), The University of Siegen in Germany (MA) and Griffith University (PhD). At Flinders he teaches modern European history. His most recent book is *POW: Australian prisoners of war in Hitler's Reich* (Sydney: PanMacmillan, 2011).

Playing with Colour – The World of Quantum Dots

P.C. Mulvaney
School of Chemistry and Bio21 Institute, University of Melbourne,
Victoria 3010, Australia

The nucleation and growth of small crystals has occupied many great scientists including Faraday, Wilhelm and Wolfgang Ostwald, Zsigmondy and Svdeberg, for over a century. In recent years, the focus has been on the smallest of these particles, so called nanocrystals: this is the area that Ostwald over 100 years ago called the "World of Neglected Dimensions."[1] Surprisingly, in Australia, although the properties of small particles play an important, indeed fundamental, role in agriculture and in mining (e.g., the froth flotation process), there has not been as much research into this fascinating area.

Of particular importance are semiconductor nanocrystals or quantum dots. These materials exhibit size quantization and are often called "artificial atoms". In this talk I will highlight some of the beautiful properties of these materials and also discuss some potential, emerging applications in areas such as solar energy conversion, light emitting diodes and tunable lasers, as well as in biolabelling.

1. *Die Welt der vernachlässigten Dimensionen*, W. Ostwald. 1914.

Professor Paul Mulvaney

Paul Mulvaney is an ARC Laureate Fellow (2011-2015) and Professor of Chemistry in the School of Chemistry and Bio21 Institute at the University of Melbourne. He received his PhD degree at the University of Melbourne in 1989, working on electron transfer kinetics with Professor Franz Grieser. He has worked as a research associate at the ANU Applied Mathematics Department (1988-89) and the Argonne National Laboratory in Chicago in 1986 and 1987 with Dr Dani Meisel. He worked as a research scientist for four years at the Hahn-Meitner Nuclear Research Institute in Berlin with Professor Arnim Henglein before returning to Australia as an ARC QEII Fellow in 1993. He was an Alexander von Humboldt Fellow in 2000 with Professor Markus Antonietti at the Max-Planck Institute for Colloids and Interfaces in Potsdam and again in 2005 with Professor Michael Giersig at the CAESAR Institute in Bonn. He currently collaborates with Bayruth University through DAAD-Go8 funding.

His interests include energy transfer in nanoscale systems, surface forces and self-assembly, nanomechanics, surface plasmon spectroscopy and solar energy conversion. To date he has published about 250 scientific papers and these have accumulated an average of 80 citations per scientific paper. He is co-inventor on five commercialised patents. Professor Mulvaney is an associate editor of the journal *ACS Nano* (IF 12) and on the editorial advisory board of four other journals. He is a member of the executive of the Australian Nanotechnology Network. He was made a Fellow of the Australian Academy of Sciences in 2009. He chaired ICONN 2008, Australia's major nanotechnology conference, which took place in Melbourne and involved 800 delegates from around the world. His current research work, funded through the ARC Laureate Fellowship program, focuses on plasmonics – the optical properties of small metal crystals. The goal of this research is to use spectroscopy to follow the basic steps in catalysis, which are essential to understanding processes such as water splitting, artificial photosynthesis and pollutant removal.

From Marsupials to Medicine: Discovery of Treatments for Heart Disease

L.J. Parry
Department of Zoology, The University of Melbourne, Victoria 3010, Australia

The peptide hormone relaxin has numerous functions in mammalian reproduction associated with the female reproductive tract. Specifically, it stimulates angiogenesis in early pregnancy, inhibits uterine contractions to prevent premature birth and remodels the birth canal to enable parturition. Our work in the tammar wallaby demonstrated that these functions are conserved in marsupials, despite the minute size of the fetus. Furthermore, the tammar fetal-placental unit signals to maternal uterine tissues to remove the inhibitory effects of relaxin on myometrial contractions, thereby affecting the timing of its own birth. Relaxin is also a key regulator of maternal haemodynamic adaptations to pregnancy by causing vasodilation and remodelling of arteries. Numerous studies in non-pregnant rodents have demonstrated that relaxin treatment results in arterial vasodilation and leads to a reduction in systemic vascular resistance. These findings led to a phase III clinical trial in acute heart failure in which a 48-hour infusion of relaxin resulted in significant and prolonged beneficial clinical outcomes. We localized relaxin receptors on endothelial cells in blood vessels and demonstrated prolonged “vasorelaxation” effects of relaxin on mesenteric arteries, involving activation of different vasodilatory pathways. This work has contributed to our understanding of the mechanisms of relaxin action in acute heart failure.

Associate Professor Laura Parry

Associate Professor Laura Parry is a teaching and research academic in the Department of Zoology and Associate Dean, Research & Industry (Faculty of Science) at the University of Melbourne. She has over 25 years experience in relaxin research in rodents, marsupials and humans, including her molecular biology training during her Alexander von Humboldt Fellowship in Hamburg (1995-1996). She received an ARC Postdoctoral Fellowship and an ARC QEII Fellowship before her appointment as a senior lecturer in the Zoology Department in 2003. Her research team currently studies the vascular actions of the peptide hormone relaxin in the context of reproductive health and cardiovascular disease, with national and international collaborators at Monash University, the University of Florida (USA) and Novartis Pharma AG (Switzerland). In the last five years, she has received nationally competitive grants (ARC Linkage, NH&MRC) and international grants (NIH, March of Dimes) totalling $4.7 million. She is also recognised for her outstanding mentoring of young scientists; her research-led teaching contributions have received university and national recognition for excellence in teaching (University of Melbourne David White Award and an Australian Learning and Teaching Council Citation for Outstanding Contributions to Student Learning).

Identifying Novel Salinity Tolerance Mechanisms by Spatial Analysis of Lipids in Barley Roots

C.B. Hill,[1] S. Natera,[1] B.A. Boughton,[2] S. Roy[3] and U. Roessner[1,2]
[1] Australian Centre for Plant Functional Genomics, School of Botany, The University of Melbourne, 3010 Victoria, Australia
[2] Metabolomics Australia, School of Botany, The University of Melbourne, 3010 Victoria, Australia
[3] Australian Centre for Plant Functional Genomics, School of Agriculture, Food and Wine, The University of Adelaide, Glen Osmond, 5064, South Australia, Australia

We face challenges to meet growing food demands in environments of changing climate and environmental stresses. Climate change and poor agricultural practices signify that 50% of current arable land is at high risk of salinity and hence unusable by 2050. We aim to develop new tools to unravel how plants respond to the perception of salt stress. Evidence is accumulating that lipid signaling is an integral part of the complex regulatory networks in the responses of plants to salinity through modifications of membrane lipids. These provide spatial and temporal regulatory functions crucial for cell survival and growth and for an appropriate response of the plant to environmental stimuli. Using lipidomics we compare the root plasma membrane (PM) compositions of different barley genotypes with contrasting salinity tolerance levels upon salt stress. Our aim is to investigate the link between PM composition and functionality in salinity by examining whether changes in lipids are involved in the alteration of fluidity, or in lipid-based downstream signaling. Imaging Mass Spectrometry will monitor spatial distributions of lipids across root sections of salt treated tolerant and intolerant barley genotypes. Novel findings will lead to a better understanding of roles of lipid composition and signaling for plant salt tolerance.

Associate Professor Ute Roessner

Associate Professor Roessner has obtained her Diploma in Biochemistry at the University of Potsdam and the John Innes Institute in Norwich, UK, after which she pursued a PhD in Plant Biochemistry at the MPI for Molecular Plant Physiology in Germany, where she developed novel GC-MS methods to analyse metabolites in plants. Together with the application of sophisticated data mining, the field of metabolomics was born and is today an important tool in biological sciences, systems biology and biomarker discovery. In 2003 she moved to Australia where she established a GC-MS and LC-MS-based metabolomics platform as part of the Australian Centre for Plant Functional Genomics for which she now leads the node at the University of Melbourne. In addition, since 2007 Associate Professor Roessner has been involved in the setup of Metabolomics Australia (MA), a federal and state government-funded national metabolomics service facility and now leads the MA node at The University of Melbourne. In 2013 Ute Roessner was successful in being awarded an ARC Future Fellowship to determine novel salinity tolerance mechanisms in barley using spatially resolved metabolomics technologies.

Playing with Pentagons and Hexagons – The Wonderful World of Fullerenes

P.A. Schwerdtfeger,[1] L. Wirz[1] and J. Avery[2]
[1] Centre of Theoretical Chemistry and Physics, The New Zealand Institute for Advanced Study, Massey University Auckland, Private Bag 102904, 0632 Auckland, New Zealand
[2] Niels Bohr Institute, University of Copenhagen, 2100 Copenhagen, Denmark

Buckminsterfullerene, C_{60}, is a convex and "spherical" molecule (in the sense that the atoms lie on the surface of a sphere) with a highly symmetric, icosahedral structure. Osawa in 1970 originally conjectured it, Kroto *et al*. discovered it in 1985 by mass spectrometry through laser evaporation of graphite, and Krätschmer *et al*. synthesized it in 1990 in larger amounts. Fullerenes are the spherical analogs to the two-dimensional graphene sheets. They occur in nature and have been detected in interstellar space, albeit in minute amounts. In general, fullerenes are cage-like, hollow molecules of pseudo-spherical symmetry consisting of pentagons and hexagons only, resulting in a trivalent (and in the most ideal case) convex polyhedron with exactly three edges (bonds) joining every vertex occupied by carbon atoms. In graph theoretical terms, fullerenes belong to the class of cubic, planar, 3-connected and simple graphs, consisting of 12 pentagons only (the 12 Pentagon Theorem) and *n* hexagons. These unusual structures can be extended to more general surfaces or topologies of higher genus showing a rich and beautiful mathematical structure. Some of these unusual structures have already been synthesized. The talk will give an introduction into the interdisciplinary field of structural chemistry and mathematics.

Professor Dr Peter Schwerdtfeger

Distinguished Professor Peter Schwerdtfeger currently holds a chair in Theoretical Chemistry at Massey University and is the Founding Director of the Center of Theoretical Chemistry and Physics within the Institute for Advanced Study. He took his first degree in Chemical Engineering (Aalen), and studied both chemistry and mathematics at Stuttgart University where he received his PhD in theoretical chemistry. He held a position as a software analyst at Stuttgart University before receiving a Feodor-Lynen Fellowship of the Alexander von Humboldt Foundation to join Auckland University. He has earned many awards, amongst them the Prince and Princess of Wales Science Award, a DSc from Marburg University, the Hector medal, Fellowships of the Royal Society New Zealand and the International Academy of Quantum Molecular Science, a James Cook Fellowship and most recently a Humboldt Research Prize and the Fukui Medal. He has published close to 300 papers in international journals and books, and served on numerous research and management committees, international societies and editorial boards.

William von Blandowski – Insights From an outsider: Visions of Aboriginal Australia

E. Tree
P.O. Box 546, Castlemeine, Victoria 3450, Australia

William von Blandowski arrived Australia in 1849, aged 27, equipped with a wealth of diverse education and experience as an artist, linguist, scientist and mining engineer. Born of Polish minor aristocracy, he was German-speaking and educated, following Humboltian traditions, recognizing the interconnectedness of sciences and natural history. He was fascinated by the flora, fauna and geology of the near mythical, newly-found continent of Australia. These elements are revealed in his collections and images, which include an extensive compendium of natural history, and unique representations of Indigenous peoples and lifestyles. His images portray a sophisticated hunter-gatherer society within the Indigenous cultural landscape, and an "undeniable humanity of Aboriginal people". Through collaboration with Krefft and Mutzel, Blandowski's 'montage narratives' exhibit extraordinary, drawn, photographic and intaglio techniques, resulting in 'Australien' in an extensive archive. These images form a visual treasury of rarely revealed details of Indigenous domestic life, technologies, equipment, rituals and activities. Blandowski portrays a unique perspective of early colonial Australia, which differed dramatically from his British counterparts, in particular, the view of an outsider looking in.

William von Blandowski's images and representations reveal exceptional panoramic windows into Indigenous culture and lifestyles, offering rare insights into Aboriginal Australia. These are timely and worthy of further exploration and appraisal.

Ms Eliza Tree

Eliza Tree, Artist and Expeditioner, Dip Fine Arts. National Art School Sydney; BA Peace Studies LaTrobe, Bundoora. 2010: Retraced Major Mitchell Expedition of 1836, from Sydney through the Australia Felix. Current research into Exploration, early contact, Indigenous culture and landscape of Victoria, Exhibitions and Presentations: 'Journey through Gondwana Felix', 'The Expedition Exhibition', Major Mitchell Symposium, Castlemaine Town Hall. 'Garden of Eden, or Indigenous Cultural Landscape,' 'Journey to the Australia Felix' and 'Land Rush to Gold Rush.' These works have been exhibited regionally, accompanied by public presentations including at Historical Societies, schools, conservation and education forums. See www.elizatree.com and www.majormitchellexpedition.com. Member Royal Society; Connecting Country - Wettenhall Foundation; Dja Dja Wurrung Land Corp. (affiliate), Australian Conservation Volunteers, Landcare, Trust for Nature.

Missionaries and Their Anthropological Instructions

W.F. Veit
German Studies, School of Languages, Literatures, Cultures and Linguistics,
Monash University, Clayton, Victoria 3800, Australia

When the German Lutheran missionaries were sent to Australia to work among the Australian indigenous peoples of the Northern Territory, they had no anthropological education to speak of. This is particularly true for Carl Strehlow who, born in 1870 and educated from 1888 to 1891, in the Lutheran Mission College in Neuendettelsau, arrived in Adelaide in 1892 and went straight to work with Pastor Reuther at Killalpaninna south of Lake Eyre among the Diari, before being sent to Hermannsburg in 1894 to resurrect the abandoned Lutheran Mission Station of Finke River Mission owned by the South Australian Immanuel Synod. The records of the Curriculum at Neuendettelsau show no subjects teaching anthropology. As a contribution to the history of research methodology, I intend to give a brief outline of:

1) the learning process of question and answer in the case of Carl Strehlow's anthropological research as a special case; and
2) the early development of research instructions in general.

Associate Professor Walter F. Veit

Born in Germany in 1935, Walter Friedrich Veit was educated at the universities of Tübingen and Cologne, where he studied History, Philosophy, German Literature and Comparative Literature. He received his doctorate in 1960 from the University of Cologne. From 1963 to 1965 he taught German at the University of Ceylon. In 1967, he came to the Department of German Studies at Monash University where he is now, after his official retirement in 2000, an Adjunct Associate Professor. He taught German Literature and Philosophy, Comparative Literature, and European Studies. His research and publications comprise the areas of literary theory, comparative and intercultural studies, history of ideas, Australian-German intellectual relations, and travel literature. He has been Visiting Professor at the universities of Cologne, Berlin and Kiel. He was president of the Australian and South Pacific Association of Comparative Literature Studies (ASPACLS) and vice-president of the Contemporary European Studies Association of Australia (CESAA), and is at present a member of the Executive of the International Comparative Literature Association (ICLA). He is also an Honorary Member of the Australian Association of von Humboldt Fellows.

Cyclic Deformation in Ice and Impact of Grain-scale Processes in Polar Ice Sheet

C.J.L. Wilson,[1] M. Peternell,[2] D. Hammes,[2] S. Piazolo[3] and V. Luzin[4]
[1] School of Geosciences, Monash University, Victoria, 3800, Australia
[2] Department of Earth Sciences, University of Mainz, 55099 Mainz, Germany
[3] Department of Earth Sciences, Macquarie University, NSW, 2109
[4] Australian Nuclear Science and Technology Organisation (ANSTO), Lucas Heights, NSW

Major polar ice sheets and ice caps experience cycles of variable flow during different glacial periods and as a response to past warming. The rate and localisation of deformation inside an ice body controls the evolution of ice microstructure and crystallographic fabric. This is critical as the final fabric in polar ice sheets provides a record of deformational history, a control on the viscosity of ice during further deformation and affects geophysical sensing of ice sheets. Identification of layering in ice sheets, using seismic or ice radar techniques, is attributed to grain size changes and fabric variations. Such information has been used to provide information on climate state and its changes over time, and, as the latest IPCC report points out, there is currently still a lack of understanding of internal ice sheet dynamics.

To answer this we have recently conducted experiments at ANSTO to collect fully quantitative microstructural data from polycrystalline, heavy water (D_2O) ice deformed in a dynamic regime. The ice and temperature (-7°C) chosen for this study is used as a direct analogue for deforming natural-water ice as it offers a unique opportunity to link grain size and texture evolution in natural ice at -10°C. Results show a dynamic system where steady-state rheology is not necessarily coupled to microstructural and fabric stability. This link needs to be taken into account to improve ice-mass deformation modelling critical for climate change predictions.

Professor Chris Wilson

Chris Wilson is a structural geologist who is now an Honorary Professorial Fellow at Monash University, after a long period as a Professor at Melbourne University. His research interests have focused on a better understanding of the tectonic evolution of orogenic belts, which led him to Antarctica where he has been involved for over 30 years in both geological and glaciological studies. Since the early 1980's, Chris has been involved in collaborative geological projects with the Bundesanstalt für Geowissenschaffen und Rohstoffe (BGR) and various German universities, for example GANOVEX in northern Victoria Land and PCMEGA in the Prince Charles Mountains, Antarctica. It is his fascination with micro-scale processes that has lead Chris to undertake experiments on ice in order to generate an accessible analogue to other geological materials as well as having glaciological applications.

Nobel Laureate Rudolf Mössbauer and His Impact on Australian Science

G. Wortmann
Department of Physics, University of Paderborn, D-33095 Paderborn, Germany

The award of the Nobel Prize 1961 in Physics to Rudolf Mössbauer, a young German post-doctoral fellow, born in 1929 in Munich, had a strong and very positive impact on German science in the years after 1945. Rudolf Mössbauer studied physics at the Technical University Munich (TUM) with Professor Heinz Maier-Leibnitz as adviser for his PhD thesis, which he finished 1958. In his PhD work, he detected the “recoilless nuclear resonance fluorescence of gamma radiation”, which was later named the Mössbauer Effect (ME). From 1960 to 1964, Rudolf Mössbauer was a scientist at the California Institute of Technology (Caltech) and became Professor of Physics there in 1962.

He returned to the TUM in 1964 as Professor in the newly formed Department of Physics, transformed on his request from the previous Faculty of Physics into the American department system. In this Department of Physics, located outside of Munich in Garching at the site of the first German nuclear research reactor, Mössbauer´s group and the group of Professor Paul Kienle applied the ME to various topics of solid-state and nuclear physics, as well as to chemistry and especially to biology. Professor Mössbauer used his international reputation for scientific exchange, most importantly the exchange of scientists with Russia during the cold war. His wide scientific interests are documented by his move in 1972 to Grenoble for a five-year term as director of the high-flux nuclear reactor of the Institute Laue-Langevin (ILL).

On returning to Munich in 1977, his interests changed to neutrino physics, a most challenging subject even today. RLM, as we called him for short, was extremely engaged in teaching, and admired by the students and the international community for his brilliant lectures. On retirement in 1997, RLM maintained contact with the Mössbauer community by visiting conferences and reporting on the history of his effect. Finally, RLM was an excellent piano player, providing us with great pleasure on special occasions. RLM passed away 2011 in Munich.

There is still a world-wide community applying the ME. Scientists are connected via IBAME (International Board on the Application of the ME), in charge of organizing conferences in a two-year sequence and publishing a journal linked with a web-site announcing actual events and activities. The Australian ME community, located here at various universities, has a long and successful tradition with scientific activities using the ME in different fields, selected examples will be presented. Members of the Australian community have been involved in organizing in Canberra the International Conference on Hyperfine Interactions and Nuclear Quadrupole Interactions (HFI/NQI 2014), and previously they organised in Melbourne the ICAME 1987, the Internationial Conference on Applications of the Mössbauer Effect.

Professor Dr Gerhard Wortmann

Gerhard Wortmann was born in 1943 in Munich, studied Physics at the TUM and performed his Diploma and Doctoral thesis at the institute of Professor Mössbauer. After his PhD in 1971 he stayed as assistant at this place, with a year as postdoc in the US. In 1979 he moved to the Free University Berlin where he obtained Habilitation in 1986 and his first professorship. In 1989 he moved as Professor in Experimental Physics to the University of Paderborn, from where he retired in 2008. He applied Mössbauer spectroscopy at all these stations, with exciting new applications using synchrotron radiation for Mössbauer

spectroscopy, also under very high pressures. [See *Science* **287**, 1250 (2000).] He is still active with the investigation of the actual Fe-based superconductors. [See *Nature Materials* **8**, 630 (2009).]

Index to Contributing Authors' Abstracts and Biodetails

List of Registrants

Name	Affiliation
Allen, Harry	University of Auckland, New Zealand
Andrae, Dirk	Freie Universität Berlin, Germany
Anton, Eva-Maria	Victoria University of Wellington, New Zealand
Badoer, Emilio	RMIT University, Melbourne, Vic.
Birch, Bill	Museum Victoria, Melbourne, Vic.
Bloom, Walter	Murdoch University, Perth, W.A.
Borger, Neville	Royal Society of Victoria
Borger, Tata	Royal Society of Victoria
Boyce, Julie	Monash University, Clayton, Vic.
Bremhorst, Klaus	University of Queensland, St Lucia, Qld.
Bretag, Allan	University of South Australia, Adelaide, S.A.
Clark, Barry	Astronomical Society of Victoria, Melbourne
Cole, Jared	RMIT University, Melbourne, Vic.
Crocker, Austin	P.O. Box 546, Castlemaine, Vic.
Day, Robert	University of Melbourne, Melbourne, Vic.
Digby, Matthew	University of Melbourne, Melbourne, Vic.
Dixon, Bettye	Bureau of Meteorology, Melbourne, Vic.
Double, Kay	University of Sydney, Sydney, N.S.W.
Dyer, Adrian	RMIT University, Melbourne, Vic.
Entwisle, Timothy	Royal Botanic Gardens Melbourne, Vic.
Finlayson, Trevor	University of Melbourne, Melbourne, Vic.
Fowler, Rachel	Royal Botanic Gardens Melbourne, Vic.
Frankenberg, Stephen	University of Melbourne, Melbourne, Vic.
Frauendiener, Joerg	University of Otago, Dunedin, New Zealand
Garcia, Jair	RMIT University, Melbourne, Vic.
Giere, Peter	Museum für Naturkunde, Berlin, Germany
Gillbank, Linden	University of Melbourne, Melbourne, Vic.
Goerigk, Lars	University of Melbourne, Melbourne, Vic.
Gunnersen, Jenny	University of Melbourne, Melbourne, Vic.
Hill, Camilla	University of Melbourne, Melbourne, Vic.
Hollenberg, Lloyd	University of Melbourne, Melbourne, Vic.
Home, Rod	University of Melbourne, Melbourne, Vic.
Howard, Scarlett	University of Melbourne, Melbourne, Vic.
Jeffries, Stephen	Monash University, Clayton, Vic.
Joyce, Edmund	University of Melbourne, Melbourne, Vic.
Kennedy, Norman	Royal Society of Victoria
Kilah, Nathan	University of Tasmania, Hobart, Tas.
Kirsop, Wallace	Monash University, Clayton, Vic.
Könning, Matthias	University of Melbourne, Melbourne, Vic.
Lacey, Geoffrey	University of Melbourne, Melbourne, Vic.
Leahy, Frank	University of Melbourne, Melbourne, Vic.
Le Feuvre, Matthew	University of Melbourne, Melbourne, Vic.
Lightfoot, Diane	Royal Society of Victoria
Lüdecke, Cornelia	University of Hamburg, Hamburg, Germany
Marceau, Ross	Deakin University, Geelong, Vic.
Maroske, Sara	Royal Botanic Gardens Melbourne, Vic.
McCann, Doug	Royal Society of Victoria
McFadden, Geoff	University of Melbourne, Melbourne, Vic.
McMullen, Gabrielle	Mary Aikenhead Ministeries, Bondi Jn., N.S.W.
Mei, Yuan	Monash University, Clayton, Vic.
Menzies, Brandon	University of Melbourne, Melbourne, Vic.
Monteath, Peter	Flinders University, Adelaide, S.A.
Morris, Colleen	North Melbourne Inst. of TAFE, Fairfield, Vic
Mulvaney, Paul	University of Melbourne, Melbourne, Vic.

Nelson, John	Monash University, Clayton, Vic.
Nicholls, Ian	Monash University, Clayton, Vic.
Ninnis, Elizabeth	Swinburne University of Techn., Hawthorn, Vic.
Parry, Laura	University of Melbourne, Melbourne, Vic.
Phuong, Lynette	Royal Society of Victoria
Rizos, Chris	University of N.S.W., Sydney, N.S.W
Robertson, Craig	Royal Society of Victoria
Roessner, Ute	University of Melbourne, Melbourne, Vic.
Selwood, Lynne	University of Melbourne, Melbourne, Vic.
Schmidt, Imke	Monash University, Clayton, Vic.
Schwerdtfeger, Peter	Massey University, Auckland, New Zealand
Shrestha, Mani	RMIT University, Melbourne, Vic.
Simpson, Neil	Royal Society of Victoria
Struve, Walter	State Library of Victoria, Melbourne, Vic.
Sturmfels, Michael	Royal Society of Victoria
Teakle, David	University of Southern Qld, Brisbane, Qld.
Tebble, Helen	Monash University, Clayton, Vic.
Thorne, Peter	Royal Society of Victoria
Tree, Eliza	P.O. Box 546, Castlemaine, Vic.
Veit, Walter	Monash University, Clayton, Vic.
Williams, Nicola	Monash University, Clayton, Vic.
Williams, Mike	Royal Society of Victoria
Wilson, Chris	Monash University, Clayton, Vic.
Wood, Beverley	Royal Society of Victoria
Wortmann, Gerhard	University of Paderborn, Paderborn, Germany
Zillman, John	Bureau of Meteorology, Melbourne, Vic.

Symposium Notes

Symposium Notes

The Royal Society of Victoria