



The Bulletin 436

The Royal Society of New South Wales

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RSNSW & SMSA

Women & Science

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**'Women at the Frontiers of
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Patron of The Royal Society of NSW

Her Excellency The Honourable Margaret
Beazley AO QC
Governor of New South Wales

1277th OGM & Open Lecture

'Bodies and Minds in Animal Evolution'

Wednesday, 2nd October 2019

Professor Peter Godfrey-Smith FRSN

School of History and Philosophy of Science
University of Sydney



See page 3 for more information

Date: Wednesday 2nd October 2019

Time: 6:00 pm for 6:30 pm

Venue: Gallery Room, State Library of NSW
(Entrance: Shakespeare Place, Sydney)

Dress: Business

Entry: \$15 for Members, Fellows and Associate Members of the
Society, \$5 for full-time Students, \$25 for Non-Members
(including a welcome drink)

Dinner (including drinks): \$100 for Members and Associate Members,
\$120 for Non-Members, \$75 for students.

Reservations: <https://nsw-royalsoc.currinda.com/register/event/62>

Enquiries: royalsoc@royalsoc.org.au Phone: 9431 8691

All are welcome.

From the President



This month is expected to see an important event in the modern history of the Royal Society of NSW, namely the creation of the Hunter Branch of the Royal Society, bringing to two the number of active Branches: the Hunter Branch will join the long-standing and successful Southern Highlands Branch – serving as a reminder that the Society exists to serve the whole of New South Wales. The Society's Council is enthusiastic about the formation of active new branches, and has promised all assistance to the nascent Hunter Branch. The essential precondition for establishing a new branch is of course the commitment of a group of locals, prepared to work to see it happen. The Hunter region has that commitment.

By now all members should have received an invitation to the meeting in Newcastle on October 9, at which a motion to form the Hunter Branch will be put, and a Branch Committee formed. This will be a memorable occasion, with a talk presented during dinner by the NSW Chief Scientist and Engineer, Professor Hugh Durrant-Whyte FRS FAA FRSN.

If you are unable to attend the meeting, but live or work in the Hunter region, or otherwise are interested to join the Branch, we will let you know how to do this is due course. But the first step is to get the Branch established!

On a different topic, if you are reading this it is likely that you are one of the many who find this electronic Bulletin to be of value, and are happy to see this item arrive in your inbox each month. The present Editor, Dr Laurel Dyson, has done a superb job with the Bulletin for the past two years, but now feels that it is time to move on, so as a result we are looking for a new Editor. If you think you might be willing and able to take on the task of putting together the monthly Bulletin, do please let me or the Honorary Secretary know at president@royalsoc.org.au or secretary@royalsoc.org.au, so that we can discuss the matter with you. Laurel has offered to make the transition as painless as possible.

Ian H. Sloan AO FAA FRSN
President
Royal Society of New South Wales
President@royalsoc.org.au

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Professor Peter Godfrey-Smith FRSN
School of History and Philosophy of Science
University of Sydney
‘Bodies and Minds in Animal Evolution’



Charting the evolution of different kinds of animal bodies helps us understand the evolution of the mind – both the varieties of minds that might exist, and how minds could arise at all through natural processes. Cephalopods, including octopuses, are an especially interesting case in bodily and behavioural evolution, as their nervous systems are built on an entirely different design from ours; they have a more decentralized, distributed architecture, along with considerable complexity. I’ll spend some time describing octopus behaviours at field sites in NSW. In other ways, too, Australia has a special place in the deep history of animal life.

Professor Peter Godfrey-Smith FRSN grew up in Sydney, and his undergraduate degree is from the University of Sydney. He studied for a PhD in philosophy at the University of California San Diego, and then taught at Stanford University, the Australian National University, Harvard University, and the CUNY Graduate Center before taking up his present post as Professor of History and Philosophy of Science at the University of Sydney. He is the author of five books, including *Darwinian Populations and Natural Selection* (Oxford, 2009), which won the 2010 Lakatos Award, and *Other Minds: The Octopus, The Sea, and the Deep Origins of Consciousness* (Farrar, Straus and Giroux, 2016).



Hunter Branch

Royal Society of New South Wales

Inaugural Meeting and Open Lecture

An inaugural meeting to establish the Hunter Branch of the Royal Society of New South Wales is planned for 6.00pm on Wednesday, 9th October 2019. The meeting will be accompanied by a lecture by NSW Chief Scientist and Engineer Professor Hugh Durrant-White FRS FAA FRSN and followed by a dinner at 7.30pm.

The meeting is open to all comers (i.e., Members and Fellows of the Society, guests and non-members), although only members and fellows will be entitled to vote at the meeting. The Meeting Agenda is available at:

https://royalsoc.org.au/images/easyblog_docs/Agenda_RSNSW_Newcastle_Meeting-20191009.pdf

- Date:** Wednesday, 9 October 2019
- Time:** 6 pm (Meeting and Open Lecture); 7.30 pm (Dinner)
- Location:** Newcastle Club, 40 Newcomen Street, Newcastle
- Entry:** Open to Fellows, Members, and Associate Members of the Society, Guests and Non-Members
- Cost:** Complimentary (Meeting and Open Lecture); Dinner \$98 for all
- Dress code:** Business
- Enquiries:** royalsoc@royalsoc.org.au or Emerita Professor Eugenie Lumbers, Acting Honorary Secretary, 0416 154 106
- Registration:** <https://nsw-royalsoc.currinda.com/register/event/69>
Registrations are limited to 60 people. Registrations close Thursday 3rd October
- Accommodation:** Should attendees require accommodation in Newcastle, please contact the Newcastle Club on (02) 4929 1224 and mention that you are attending the RSNSW Meeting being organised by Professor Lumbers.

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Open Lecture

Professor Hugh Durrant-Whyte FRS FAA FRSN

NSW Chief Scientist and Engineer

‘Industries of the Future’



The NSW Office of Chief Scientist and Engineer (OCSE) supports a range of ‘prosperity initiatives’ aiming to translate the best of NSW research into industry outcomes: from quantum technologies to robotics for agriculture, from advanced manufacturing to synthetic biology. This talk will describe the range of these initiatives including the support of Centres of Excellence, National Research Infrastructure, industry innovation networks and the new Physical Sciences Investment fund. This talk will also describe the close working of OCSE with other NSW Government Departments and Industry to develop a future industry strategy around emerging precincts and technology ecosystems.

Professor Hugh Durrant-Whyte is the NSW Chief Scientist and Engineer. From 2014-16 and 2002-2010, he was a Professor and ARC Federation Fellow at the University of Sydney. From 2010-2014, he was CEO of National ICT Australia (NICTA), and from 1995-2010 Director of the ARC Centre of Excellence for Autonomous Systems and of the Australian Centre for Field Robotics (ACFR). Hugh is a world-leading authority on machine learning and robotics, and its application in areas including cargo handling, mining and defence. He has published over 300 research papers, graduated over 70 PhD students, and has won numerous awards and prizes for his work, including being named 2010 NSW Scientist of the Year.

In his career he has worked with many major companies, has co-founded three successful start-ups, and has won many awards including being named 2008 Engineers Australia NSW Engineer of the Year. He is well known for his work with Patrick Corporation in delivering the automated container terminals in Brisbane and Port Botany, and for his work with Rio Tinto in pioneering the delivery of the automated ‘Mine of the Future’. He is a Fellow of the Royal Society of NSW, an honorary Fellow of Engineers Australia (HonFIEAus), a Fellow of the IEEE (FIEEE), Fellow of the Australian Academy of Technological Sciences and Engineering (FTSE), Fellow of the Australian Academy of Science (FAA), and a Fellow of the Royal Society of London (FRS).

Southern Highlands Branch Royal Society of New South Wales

Professor Toby Walsh

Scientia Professor of Artificial Intelligence

University of New South Wales

'2062 - The World that Artificial Intelligence Made'



2062 is the year by which we will have built machines as intelligent as us. This is what the majority of leading artificial intelligence and robotics experts now predict. But what will this future actually look like? When the quest to build intelligent machines has effectively been successful, how will life on this planet unfold? In this talk, I will consider the impact AI will have on work, war, politics, and economics. Will automation take away jobs? Will robots become conscious and actually take over? How will political institutions adjust to the post-truth, post-privacy digitised world? What lies in store for our children in 2062?

Toby Walsh is Scientia Professor of Artificial Intelligence at the University of New South Wales and Data61, guest professor at the Technical University of Berlin, and adjunct professor at QUT. He was named by the *Australian* newspaper as one of the 'rock stars' of Australia's digital revolution. Professor Walsh is a strong advocate for limits to ensure AI is used to improve our lives. He has been a leading voice in the discussion about autonomous weapons (aka 'killer robots'), speaking at the UN in New York and Geneva on the topic. He is a Fellow of the Australia Academy of Science and recipient of the NSW Premier's Prize for Excellence in Engineering and ICT. He appears regularly on TV and radio, and has authored two books on AI for a general audience, the most recent entitled *2062: The World that AI Made*.

Date: Thursday, 17 October 2019

Time: 6.30 pm

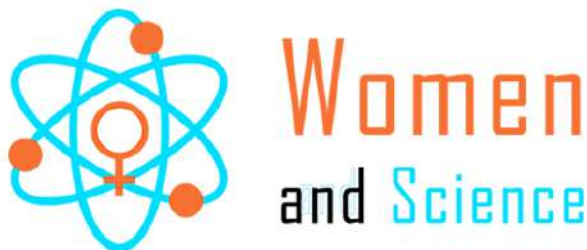
Location: Nattai/Joadja Room, Mittagong RSL

Further Information: www.royalsocietyhighlands.org.au/lectures/lectures.htm

Royal Society of New South Wales & Sydney Mechanics' School of Arts

Women and Science: Lecture 6

Dr Susan Pond AM FRSN FTSE FAHMS Women at the Frontiers of Biotech



Susan Pond outlines how biotechnology is being put to use for the good of humanity and the planet, and examines the role of women in this revolution from the time of Rosalind Franklin's famous Photo 51 in 1952 through to today. Franklin's work was fundamental to the celebrated revelation of the twisted ladder of the DNA double helix by Watson and Crick in 1953. This opened the floodgates to a revolution in biology and to Nobel Prizes being awarded to 13 women since 1964. Susan will also look forward to future applications and review some of the challenges involved in putting nature's machinery to work.

Dr Susan Pond AM FRSN FTSE FAHMS has a deep scientific and commercial background in biotechnology through her executive and non-executive roles during the last 20 years and current appointments. Susan has a first-class honours degree in Bachelor of Medicine and Surgery from the University of Sydney and Doctor of Medicine degree from the University of New South Wales. She held professorial appointments at the University of California, San Francisco, and the University of Queensland before joining industry. She was recognized as one of the Australian Financial Review and Westpac Top 100 Women of Influence in 2013 and is a Fellow of the Royal Society of NSW, the Academy of Technology and Engineering, and the Academy of Health and Medical Sciences.



- Date:** Thursday, 17 October 2019
Time: 6 pm (for registration and light refreshments), talk 6.30 to 7.30pm
Cost: \$15 members of RSNSW and SMSA, \$20 non-members and guests
Location: Sydney Mechanics' School of Arts, 280 Pitt St, Sydney
Registration: <https://smsa.org.au/2019/01/11/rsnsw-smsa-lectures-2019/>

The 2019 Biennial Symposium of the Australian and New Zealand Associations of von Humboldt Fellows

Sharing Knowledge in the Spirit of Humboldt



The 2019 biennial symposium of the Australian ([AAvHF](#)) and New Zealand ([NZAvHF](#)) Associations of von Humboldt Fellows will be devoted to addressing pressing challenges of research communication, dissemination and impact. The symposium aims to rethink what ‘sharing knowledge’ means in today’s world. It will be a forum for debating the role of academic publishing, media engagement, social media, academic networks, research-industry links, interdisciplinary collaboration, and research communication in contexts of linguistic and cultural diversity.

This year marks the 250th anniversary of the birth of Alexander von Humboldt, and the symposium will be an opportunity to reflect on his legacy. He was not only a pioneering researcher, explorer and thinker but also an extraordinary research communicator. Humboldt reminds us that conducting research has never been enough: knowledge needs to be shared to be meaningful. The Journal of the Royal Society of New South Wales will be publishing the proceedings of the Symposium.

This high-powered interdisciplinary event will be particularly attractive for early and mid-career researchers wishing to connect with Humboldt Fellows from across the disciplines and interested in learning more about research funding and collaboration opportunities available in Germany.

Dates: Friday 22nd to Sunday 24th November 2019

Location: Macquarie University

Cost: \$110-\$165

Information and Registration: <http://events.mq.edu.au/events/sharing-knowledge-in-the-spirit-of-humboldt/event-summary-06cc6f25fd8e45c3b3df8d2e365ad6dc.aspx>

Report of the 1276th OGM

Wednesday 4th September 2019

Professor Hans Pols FRSN

Head, School of History and Philosophy of Science
University of Sydney

‘Physicians as Public Intellectuals: Indonesian Physicians in the Dutch East Indies’

Through their studies, their medical practice, and their participation in the Association of Indonesian Physicians, Indonesian physicians in the Dutch East Indies developed and articulated a strong professional identity. The promises of modern medicine were important elements of this professional identity and motivated these physicians to develop critical perspectives on colonial society. They participated in social and cultural movements, and became members of city councils and the colonial parliament, wrote in newspapers frequently, and published magazines. The lecture discussed the social and political engagement of several generations of Indonesian physicians. At various times, they criticised traditional culture, advocated public health measures and increases in funding for health, criticised income disparities between Indonesian and European physicians, criticised traditional culture or embraced it as a model for an alternate modernity for Indonesia. During the process of decolonisation, they transformed colonial medicine into a modern approach to maintain health, inspired by examples and connections all over the world.



Professor Pols FRSN opening his talk

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Report of the 1276th OGM (contin.)

Lingzhi Kang

2019 People's Choice Winner of Three-Minute Thesis (3MT) Competition, University of Wollongong

‘Biofabricated Platforms for Wound Healing and Skin Regeneration’



Lingzhi Kang receiving her certificate of Associate Membership from the President

Continuing our series of presentations by winners of 3-Minute Thesis Competitions, Miss Lingzhi Kang, a final-year PhD student at the University of Wollongong, gave a talk at our OGM in September. She is supervised by Distinguished Professor Gordon Wallace AO FRSN. She obtained her masters degree at Shandong University, doing research on vascular regeneration and tissue engineering, having undertaken her bachelors degree in Biomedical Engineering at Beijing Institute of Technology, Beijing, China.

Imagine, there is something wrong with your skin – it has no hairs, no pores, no blood vessels. That’s what happens with the scar tissue of burn patients. You cannot even sweat to bring your temperature down. It even effects the beating of your heart. Burns are a global health issue and life changing events. In Australia 50,000 people suffer from burns and the shortage of skin grafts. If a burn patient can receive a skin graft within five days, they have a much higher rate of success.

The main goal of Miss Kang’s PhD project is to construct artificial skin substitutes to address the issue of skin graft shortage. It takes only 20 minutes to produce artificial skin. In addition, she explores how to minimize scar formation, eventually improving the quality of life: ‘We are not just regenerating skin but also regenerating hope.’

Report of 18 September 2019

Royal Society of NSW

Southern Highlands Branch

Dr Rebecca Carey

Senior Lecturer

University of Tasmania

‘2018 East Rift Zone Eruption of Kilauea Volcano’

Before Dr Rebecca Carey’s lecture, a few minutes were taken to acknowledge two outstanding STEM students from Bowral High School. The charter of the Royal Society is to support and encourage the world of Science, the Arts, Literature and Philosophy. The lecture series in the Southern Highlands has run monthly for many years, bringing awareness of the latest developments in these four broad disciplines to our Southern Highland audiences. Now the Southern Highlands Branch has entered the next stage of its community contribution by becoming involved in personally supporting young scientists in our region. The photograph below shows two of these budding scientists flanked by the Bowral High School Head of Science Tim Flaus, and on the right, Dr Rebecca Carey. The audience of 103 people showed their strong support for this latest initiative.



Winning students flanked by Mr Timothy Flaus and Dr Rebecca Carey

Dr Rebecca Carey flew in from New Zealand to deliver this excellent lecture. In her field of volcanology, she has applied her expertise to the study of both modern and ancient subaerial and seafloor volcanoes and products. She has authored more than 37 publications including a chapter in volcanology’s leading reference publication *The Encyclopedia of Volcanoes*. She was

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the Chief editor of an AGU Monograph titled *Hawaiian Volcanoes: From Source to Surface*. It was therefore not surprising to find that much of her lecture concentrated on these Hawaiian volcanoes, where she showed astonishing footage of major eruptions, and the resultant high-speed lava flows across the Hawaiian countryside, roads and domestic subdivisions. Audience members audibly gasped when presented with such scenes. Dr Carey commented that in some sequences, the flow of the lava was so rapid that standing waves were readily observable.



Lava dashing into the sea at Kilauea (Image by theartist312 / Getty Images)

Much of the lecture concerned the studies that are being undertaken to further understand the mechanics of such lava flows, and what authorities and communities should be doing, and are doing, to protect themselves, their homes and established settlements in this forever changing physical environment. Dr Carey showed several dramatic sequences where boiling lava was rushing down hillsides to plunge into the sea. Amazingly tour operators were making a living taking their boats full of sightseers dangerously close to the points of impact. She signaled that this was yet another area where authorities should be closely monitoring the dangerous conditions to which travelers and residents were being subjected.

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Dr Carey described her research as being in four main areas: (1) magma ascent and degassing processes, (2) eruption plumes and pyroclast transport, (3) subaerial and submarine volcanic architectures in both modern and ancient settings, (4) lava rheology and emplacement processes. Included in the numerous scientific missions in which she has found herself, she has served as Co-Chief Scientist for the US NSF-funded research voyage on submarine volcanic systems, which utilized underwater vehicle technologies.



Incandescent lava flows from Fissure 8 in the East Rift Zone, Kilauea Volcano (photo by the United States Geological Survey)



Lava Fountaining from Fissure 22, Kilauea Volcano (photo by the United States Geological Survey)

This was a fascinating, engaging and inspiring lecture. We can only wonder what impact Dr Rebecca Carey's extraordinary research career has had on the young scientists present who clearly clung on her every word.

Anne Wood FRSN

Report on Lecture 5 of the Women and Science Series

Anne Harbers

‘Electricity, Astronomy, and Natural History:

From colonial Sydney to Royal Sweden, and
a ladies’ academy of science in between’



Anne Harbers, an historian of art and science, particularly of the Netherlands and Scandinavia in their ‘Golden Age’, started her talk on 23 September with a later Australian, Fanny Macleay. We have no image of her, but Fanny’s writings and collections have come down to us. Home schooled (at the outrageous rate of 15s a lesson (£100 now)), Fanny was a collector and illustrator of botanical and entomological specimens, assistant to her father and correspondent of her brother.

We then segued to Rachel Ruysch, the 17th C painter of botany, considered as one of the greatest still life painters of any age. She also helped her father (*inter alia* having 10 children) establish the famous ‘Cabinet of Curiosities’, a museum of bizarre tableau of human skeletons and body parts eventually sold to Tsar Peter the Great of Russia in 1717.

Next, the amazing Louisa Ulrika, Queen of Sweden, with her ‘beauty, wit and interest in science and culture’, who set up Drottningholm Palace as a museum of science. Her patronage of Carl Linnaeus gave him the opportunity to develop binomial nomenclature of living organisms.

Finally, we reach the Women’s Society for Natural Knowledge in Middelburg in the Netherlands, which flourished for more than 100 years between 1785 and 1887. The seaport was the capital of Zeeland and major centre of the Dutch East Indies Company (the VOC), and so was very rich. There was a scientific society for men, but in 1785, 44 women from the town’s elite came together to ‘master the principles of nature’. They could afford equipment to demonstrate the modern phenomena of electricity and explore the world with telescopes and microscopes.

The talk was well researched and introduced the appreciative audience to a new aspect of the Enlightenment.

Brynn Hibbert AM FRSN.

Schedule of RSNSW Events 2019

Date	Event	Speakers	Topics and Presentations	Location
2-Oct-19	Ordinary General Meeting	Prof Peter Godfrey-Smith	Bodies and Minds in Animal Evolution	State Library of NSW
9-Oct-10	Hunter Branch Inaugural Meeting	Prof Hugh Durrant-Whyte FRS FRSN	Industries of the Future	Newcastle Club
17-Oct-19	Southern Highlands Branch Public Lecture	Prof Toby Walsh	2062 - The World that Artificial Intelligence Made	Nattai/Joadja Room, Mittagong RSL
17-Oct-19	Women and Science	Dr Susan Pond AM FRSN	Women at the Frontiers of Biotech	SMSA
6-Nov-19	Ordinary General Meeting	Professor Herbert Huppert	The Beginning of Weather Forecasting: Matthew Maury, Robert FitzRoy FRS and L.F. Richardson FRS	State Library of NSW
7-Nov-19	RSNSW & Four Learned Academies Forum	tba	Making Space for Australia	NSW Government House
21-Nov-19	Southern Highlands Branch Public Lecture	Ian Bryce	The Physics of the Mind: Exploring sentience, freewill, and morality	Nattai/Joadja Room, Mittagong RSL
21-Nov-19	Women and Science	Em Prof Anne Green FRSN	An Accidental Radio Astronomer	SMSA
4-Dec-19	Ordinary General Meeting	Jak Kelly Award Winner	2019 Jak Kelly Award Presentation & Christmas Party	State Library of NSW

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