UNIVERSITY OF CAMBRIDGE
ALUMNI
CAMBRIDGE SOCIETY OF VICTORIA

February 2019

Wed 20 Lunch with Katie Allen

Lunch with Katie Allen, Wednesday 20 February

Food, politics and other allergies

Professor Katie Allen is a senior doctor at the Royal Children's Hospital and a senior researcher at the Murdoch Children's Research Institute. She is also Director of the Population Health Theme and leader of the Gastro and Food Allergy Group at the Murdoch Children's Research Institute. Katie's research focuses on primary prevention and early immunological, genetic and epigenetic factors. Katie is also a Professor of Paediatrics at the University of Melbourne.

The number of children with a food allergy or food-related immune disorder has increased dramatically in the last 10 years. In fact, in 2011 the Murdoch Children's Research Institute found that as many as 10 per cent of 12-month-old infants have a clinically confirmed food allergy – one of the highest reported rates in the world. Food allergies can be very uncomfortable and even life threatening.

Another allergy that many adults suffer from is to politics. Katie stood as the Liberal candidate for the Prahran District in last year's election and won the highest number of first preference votes, but was beaten by the Greens candidate on preferences. She is currently seeking preselectiofor the Federal seat of Higgins.

In her talk Katie will discuss food allergies and politics and how they are related.

This lunch will take place at the Savage Club in Bank Place at 12 noon for 12.30pm. The club is at 12 Bank Place (off Collins Street) in the city. Cost is $55 including drinks. All guests are most welcome; the more the better. Would you please advise Peter Baines at lunches@cambridgesociety.org.au or on 9820 2334 by latest Monday noon, 18 February, if you will be coming (and dietary requirements). Those emailing their intention to attend should ring Peter to confirm if they receive no email confirmation from him within 24 hours of booking.

Golf

The autumn event with Oxford is to be held at Devil Bend Golf Club at Mooraduc on Sunday 24 March, teeing off from 08:35. Anyone interested in winning their belated light blue is asked to contact Peter Adams at golf@cambridgesociety.org.au to help us retain the Team Trophy which has, since its inception, always seen a Light Blue team victorious.

Diary dates

24 Mar	Golf with Oxford at Devil Bend
28 Mar	Lunch with Neville Norman
12 Apr	Boat Race dinner
1 May	Lunch with Prof. Martin Daunton (former Master of Trinity Hall)

Society news

At our AGM on 12 December a number of committee members were elected. With the standing-down of our erstwhile Secretary, David Rees, the opportunity has been taken to re-arrange the functions of the committee. For many years the workload has been such that only retired people could manage the position of Secretary. In an attempt to render these duties more manageable to younger members, the committee positions will be as follows:

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President: Raul Sanchez-Urbarri
Minute secretary: Michelle Cooper (organises the committee and deals with CUDAR)
Membership secretary: Annabelle Walker (attends to all membership matters)
Treasurer: Jerry Platt
Newsletter/Facebook editor: Trish Kerr Mullen
Magister prandii: Peter Baines
Golf/BR dinner: Peter Adams
Annual dinner: Antara Mascarenhas
Vice-president and web master: Fabrice Boucherat
Roving commission: Brendon Janvey
Past president: Chris Briggs

For those who do not know him, our President, Raul, is an academic lawyer from Latrobe University and actively concerned with the affairs of his troubled home country, Venezuela. Given his native tongue, he may properly be addressed as El Presidente. Those of a statistical bent will note that the demographics of the committee align with those of the society membership more closely than at any time in recent memory.

We wish to record our appreciation of the hard work put in by retiring committee members Chris Briggs, David Rees and Janelle Ward and hope to see them at future events.

Commercials

If you have an offer, message or request of a personal or not-for-profit nature that you would like us to include in this section, please contact the editor at newsletter@cambridgesociety.org.au.

Snippets

We acknowledge our particular debt to Varsity and to the University News Release Service.

Cavendish Laboratory redevelopment

Work on the University of Cambridge's £300m Cavendish Laboratory redevelopment has been marked with a ground-breaking ceremony attended by the Vice-Chancellor Professor Stephen Toope.

The development, at the West Cambridge site off Madingley Road, will provide a purpose-built centre for the University's world-leading physics research, bringing together all of the Cavendish Laboratory's research groups under one roof.

The flagship building of the new Cavendish Laboratory will be named the Ray Dolby Centre, in recognition of an £85 million gift from the estate of sound pioneer Ray Dolby – the largest philanthropic donation ever made to UK science.

In addition to the Dolby gift, the new Cavendish Laboratory is being made possible by £75 million of funding from the Engineering and Physical Sciences Research Council (EPSRC). The project, which is expected to be completed in 2022, will help strengthen the University's position as a leading site for physics research and will provide a top-class facility for the nation, with much of the research equipment made available to other institutions.

'This project is the physical embodiment of our aspirations for the University,' said the Vice-Chancellor in his remarks. 'Crucially, it will be built to encourage inter-disciplinarily; to break down the traditional boundaries between disciplines. In short, this project will allow Cavendish to continue being – as it has been since 1874 — the home of discovery.'

The building has also been designed to encourage collaboration and will host public events to support the extensive programme of work with schools and the general public.

French construction specialist Bouygues, who are building the new Cavendish Laboratory, hosted the event. Chair of Bouygues UK, Fabienne Viala and RIBA Vice-president Caroline Buckingham, joined the Vice-Chancellor and guests from the University, contractor team and the local community for the ceremony.

'Bouygues UK and our sister company Bouygues Energies & Services have been involved from the start on this exciting scheme, working alongside the University of Cambridge's existing project team to develop proposals for a new world-class laboratory,' said Viala. 'It is exciting to break ground on this project that will see us bringing innovation, a collaborative approach and our technical expertise to create a new home for major academic research.'

The new development will combine with the Department of Physics' new strategic plan and research goals. The building and new strategic plan represent a renaissance of the way the department carry out physics research and achieve their research goals.

'This is a great step in the development of physics research and learning at the University of

Cambridge,' said Professor Andy Parker, Head of the Department of Physics. 'We look forward to moving into our new facilities and opening our doors to the wider research community and the public to increase understanding and foster discovery.'

The Vice-Chancellor added: 'What we are doing here today will give future generations of scientists, from Cambridge and elsewhere in the UK, the opportunity to keep making those leaps in knowledge for which this University – and this country – are rightly celebrated.'

Search for Shackleton's *Endurance*

In early January, a team of Cambridge scientists set out on an expedition to study and map the Larsen C ice shelf in western Antarctica, and – ice conditions permitting – search for the wreckage of Sir Ernest Shackleton's *Endurance*.

Professor Julian Dowdeswell, Director of the Scott Polar Research Institute, is chief scientist on the ambitious expedition, which will use drones, satellites and autonomous underwater vehicles to study ice conditions in the Weddell Sea in unprecedented detail.

The Weddell Sea is also the site of one of the most famous stories from the 'Heroic Age' of polar exploration.

The Imperial Trans-Antarctic Expedition 1914–17 set out to cross Antarctica via the South Pole. However, in November 1915, Shackleton and his 28-man crew were confronted with one of the worst disasters in Antarctic history when *Endurance* was trapped, crushed and sunk by pack ice. The outside world was unaware of their predicament or location, food was scarce and the chance of survival was remote.

In this film, (https://youtu.be/pOAcxUhu8TI), Professor Dowdeswell tells the incredible story of *Endurance*, and how he and the other members of the Weddell Sea expedition hope to locate the wreckage of one of the most iconic vessels in polar exploration.

Climbing Everest without oxygen

Convincing the mind to climb to 8,848m without supplemental oxygen requires experience or insanity, along with an £8,700 permit. Convincing the body to take the mind there and back requires acclimatisation. How does this happen, and what are the broader implications for medical research?

In 1978, Reinhold Messner and Peter Habeler shocked the medical and mountaineering communities by reaching the top of Everest without supplemental oxygen. For good measure, Messner repeated the feat alone two years later. Of the more than 4,000 climbers to have summited the world's highest mountain, just 200 have followed in their footsteps. There is good reason for this. Although during the ascent to altitude the atmospheric percentage of oxygen remains steady at 20.9%, atmospheric pressure falls significantly. While ascending from sea level to 5000m, just below the elevation of base camp, a climber will see atmospheric pressure halve. Make it to the summit and that will fall by a further third.

The region above 8000m is colloquially referred to by mountaineers as the 'death zone' due to its inability to sustain human life for significant periods. In unacclimatised individuals, exposure to equivalent pressures consistently causes unconsciousness in under three minutes. In contrast, acclimatised mountaineers are able to survive for a few days at 8000m and make the further 848m ascent to the summit. How is this possible?

Classical physiological adaptation to altitude involves maximising oxygen delivery via respiratory, cardiovascular and haematological changes. The first hurdle is ensuring that the pressure of oxygen in the lungs, specifically in its small air sacs called alveoli, is sufficiently high. In the lungs, oxygen must compete for space with both CO_2 and water vapour readily supplied by the body. Increases in breathing rate and depth blow off CO_2 to leave more space for oxygen. This is supplemented too by changes which increase oxygen binding to haemoglobin in the blood at a given pressure. Of course, climbers, doctors and fast jet pilots alike can artificially increase the oxygen percentage in the alveoli with the use of supplemental oxygen of a higher concentration than in air, removing a further competitor, nitrogen.

There are limitations to what changes in breathing alone can achieve, however. This reality was demonstrated by recordings taken on the Xtreme Everest research expedition showing an average arterial blood oxygen saturation of only 54% in four climbers at 8,400m. A fall below 90% in an unacclimatised individual would set hospital alarm bells ringing. A fall to 54% would likely be fatal.

Crucially therefore for climbers, increasing blood oxygen saturation isn't the only means of increasing oxygen delivery to starving tissues. Firstly, the oxygen content of the blood can be increased by increasing the concentration of red blood cells and oxygen-carrying haemoglobin in excess of 25%. This is naturally induced over a period of days to weeks by the hormone erythropoietin (EPO). High-altitude training seeks to stimulate this process in athletes. In contrast, supplementary EPO is banned by the World Anti-Doping Agency and has been the subject of high-profile doping cases, such as that of former cyclist Lance Armstrong.

Although it takes days to increase the concentration of red blood cells, altitude also causes a more rapid fall in blood volume which quickly concentrates red blood cells. While reduced blood volume is thought to be behind a small reduction in the amount of blood pumped by each heartbeat at altitude, increases in heart rate can not only effectively counter this but further increase delivery of blood to the rest of the body.

There is, however, more to the story. Classical explanations of acclimatisation struggle to explain observations that physiologically similar individuals show marked variation in performance at altitude. Maximum oxygen consumption can in fact decrease during acclimatisation without alterations in oxygen delivery capacity. The authors of a study comparing Messner and Habeler to a control group concluded that 'elite high-altitude climbers do not have physiological adaptations to high altitude that justify their unique performance.' This hints at variation in the actual use of oxygen once delivered, the extent of which has genetic links. Some individuals may be more efficient at using oxygen and then require less of it once acclimatised, in keeping with observations of decreased usage in oxygen-deprived animals.

Susceptibility to altitude sickness is largely independent of age, physical fitness and, unsurprisingly, bravado. Low oxygen can cause dangerous build-ups of fluid in the lungs and brain in susceptible individuals at altitudes as low as 2500m. An increasing concentration of red blood cells increases blood viscosity, raising the risk of clotting and reducing blood flow through narrow vessels. This increases the risk of heart attacks and strokes. Tellingly, native Tibetans do not show as extensive an increase in red blood cell concentration as lowlanders but instead show changes in blood circulation.

Many climbers are therefore limited by altitude-related conditions brought about even before oxygen falls to levels that directly impair activity. To add further concern, MRI scans in 2006 of 13 climbers following attempts to climb Everest reported evidence of brain damage in all but one, despite the absence of reported altitude sickness.

Journals are awash with studies of high-altitude physiology for reasons that go beyond the allure of mountains to researchers. The processes by which the body acclimatises to altitude are also shown in patients with conditions that impair oxygen transfer such as emphysema and chronic heart disease. Research into biomarkers for acclimatisation could be used for monitoring patients and predicting their responses to illness. Already, lessons from the treatment of a build-up of fluid in the lungs at altitude have contributed towards understanding of the treatment of the event at sea level. From a research perspective, mountaineers can show similar symptoms to chronically ill patients, but crucially without the co-occurrence of other diseases that make determining the effects of a single medical intervention difficult.

The challenge of climbing Everest without supplemental oxygen is certainly one that pushes the body close to, or often beyond, its physiological and metabolic limits. Among the flow of mountaineers through base camp, there are already people for whom reaching the summit with supplemental oxygen simply isn't enough of a challenge. With the Nepalese government's decision to ban solo attempts in 2017, their number will surely increase further. This group in particular, and indeed all those who successfully ascend to high altitude, have the remarkable process of acclimatisation to thank.