

the Pembrokian



ISSUE 46, September 2020

COLLABORATION

Plant Power: Botanist, Economist and Energy Expert Professor Jon Lovett (1976)

Eco-Robotics: Pembroke Fellows revolutionising research with interdisciplinary partnership

Upcoming Events

It was with great regret that the College had to postpone two Gaudies, the 2020 Leavers Dinner, and many other popular events due to the COVID-19 pandemic. We know that these events are valuable opportunities for alumni and friends to (re)connect with each other and with Pembroke. The College team is working hard to safely restore opportunities for alumni gatherings in College, but this will take some time as the priority for the rest of this year has to be ensuring that new and returning students are given the best and safest possible College experience in the circumstances. Please bear with us.

In the meantime, the Development team and the College at large have been hosting new events online. An unexpected positive of this enforced adjustment has been that participants have joined together from around the world, and some have been recorded so that they can be enjoyed by more people in their own time. Below is a selection of highlights of the year so far. Please do join us for future events if you can – upcoming opportunities will include:

Virtual Alumni Weekend 11th & 12th September

Including the chance to meet our new Master, Sir Ernest Ryder; an introduction to a new academic seminar series Pembroke Horizons; an interview with renowned photographer Frederic Aranda (1998, Japanese); and the *Uncomfortable Oxford* online tour.

Digital Welcome 7th October

A virtual welcome to our newest alumni

Pembroke Horizons Monthly

Pembroke is launching a new online initiative which will feature our academics presenting their research. Each session will focus on a particular topic to showcase the thinking and research within college with questions invited from the audience.

Virtual Carol Concert 4th December

Whilst the guidance on event gatherings are still uncertain, this year's Carol Concert will be available to all members of the Pembroke community via live stream.

Previous Events

Careers in Unprecedented Times

During Week 8 of Trinity Term, the Development Office hosted a Careers Week. The main event of the week was a virtual discussion entitled which was attended by more than 100 students and alumni. Panelists included Paul Forster, co-founder and former CEO of Indeed, Tazeen Hasan, a specialist in gender equality and development at the World Bank, and Peter Jones, the Chief Operating Officer of the Foreign and Commonwealth Office. The event was moderated by Gabriel Schenk, co-founder of the Tolkien Lecture series here at Pembroke.

<https://bit.ly/2YhfXqt>

Virtual Business Breakfast: Cybersecurity

Nick Viney and Nina Paine held an online Business Breakfast on the 23rd of July 2020. The topic of the session was Cybersecurity and how to keep your data safe when working virtually.

<https://bit.ly/34USX50>

Painting Pembroke

Jeremy Sutton (1979, Physics) held two online art classes for members of the Pembroke community on the 22nd of April and the 2nd of June 2020. The events howed techniques for drawing a still life scene and self-portraits, with a focus on using an iPad as the artistic medium.

<https://bit.ly/2YdW3Nh>

Technos Ceremony

On the 23rd of June 2020, the first virtual Technos International Prize award ceremony took place. Full write up: <https://www.pmb.ox.ac.uk/news/technos-prize-awarded-michal-jezierski>

<https://bit.ly/2CJGjJS>

Pembroke on the Sofa

Our last 'real-life' event this year was all the way back on the 27th of February. Held at The Frontline Club in London, attendees discussed the topic of 'Reporting in the Age of Fake News' with panelists Harriet Dedman (2002, Modern History), Danny Shaw (1985, PPE) and Adela Suliman. The event was moderated by Tanya Beckett (1984, Materials Science), who has hosted the series since it began in 2010.

Subject Dinners

Throughout January and February 2020 subject tutors opened up their annual student dinners to invite alumni back to meet the current classes. These events, allowed alumni to reconnect with their subject and fellow classmates. We hope to be able to offer this again in the near future, and we will be in contact via email to inform you of relevant upcoming events.

400 Club Dinner

The inaugural 400 Club event was launched with a dinner at the RAF Club on the 16th of January 2020. The 400 Club was founded to mark the upcoming anniversary, and is open to all Pembrokeians who commit to making a regular gift to the College. The attendees heard about the fascinating research of one of our current postgraduate students and former MCR President, Louis Morris (2017, DPhil History).

Letter from the Editor



When we chose the theme for this issue of the Pembrokeian, 'Collaboration', in January, little did we know that the world would change so drastically just a few short weeks later. If we have learned anything since March, however, it is that Pembroke's commitment to being collaborative is at the foundations of our resiliency and our relevance in times of trouble.

Whether it is the involvement of Pembrokeians on the front line of Covid, or the continued commitment of the entire College community to keep students and staff safe while feeding Oxford's homeless and providing the books, tutorials, lectures and welfare support that all students needed to continue studying, we have worked together for the greater good of our communities large and small. Our students have been just as active as staff in building virtual opportunities for each other to engage, explore, enjoy, and stay involved in the issues of the day. You would be hugely proud of their inventiveness, care for one another, and commitment to making the world a better place.

Just look to your right at what is featured in this Pembrokeian and page 13 detailing the launches of Pembroke Connects and Pembroke Links. You will see that with the collaboration of alumni, the College has not just continued to communicate, entertain, enlighten, and support its members, it has actually developed new ways to engage and interact that are stronger than ever before.

Throughout this issue, you will also see how the research being done by our Fellows and alumni is an exemplar of collaboration, whether it is an Engineering Fellow and a Biology Fellow developing new capabilities over lunch in the SCR, a digitally-based History project involving students and colleagues around the world, or bringing together both the natural and social sciences to address global challenges. Working together has never been more important.

Enjoy this glimpse into Pembroke in a time of change.

Andrew Mitchell

Alumni Engagement Officer

In the midst of the global pandemic and UK lockdown the Pembroke marked the transition of the College Mastership from Dame Lynne Brindley to Sir Ernest Ryder. Without the usual opportunities to host events in person Dame Lynne became the first College Master to say her farewells by video message, and Sir Ernest has been meeting academics and alumni in online chats.

Dame Lynne's farewell message to the College community can be found at: www.pmb.ox.ac.uk/ljb-farewell. The next edition of the Pembroke Record will contain a full farewell to Dame Lynne and welcome to Sir Ernest.

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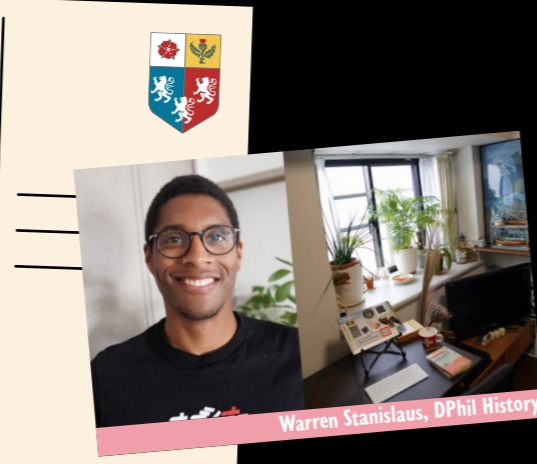
Edited by Andrew Mitchell
Design by Alex Walker



Pembroke Postcards

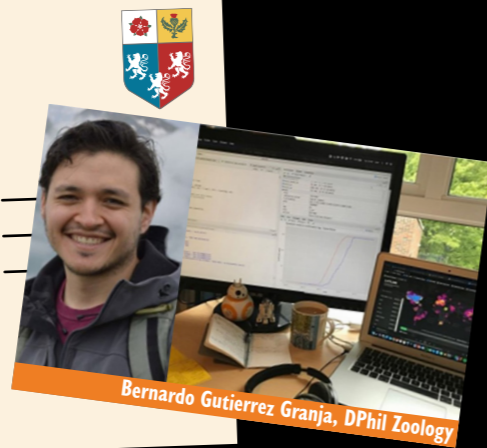
During our first ever “virtual” term, students and staff sent digital postcards from their lockdown surroundings to tell us about how they were adapting. Below are just a few examples. You can see more at www.pmb.ox.ac.uk/postcards

Yōkoso (welcome) to my Tokyo apartment. I'm a third year DPhil history candidate. My research is a transnational history of laughter and political satire in 19th century Japan. In Hilary I left Oxford for what I expected to be a short research trip to Tokyo. Plans changed and I'm still here. I'm now a researcher with Rikkyo University where I will be writing my dissertation and delivering a course as a lecturer. Japan is in "lockdown lite". Although I can't access the libraries, the options to sing in a karaoke booth or visit a pachinko parlour are still available. Choosing not to gamble with my own life or that of others, I am staying home and practicing a new karaoke number in the shower.



Warren Stanislaus, DPhil History

As a DPhil student working with emerging viruses, it's been "all hands on deck" for our research group since the start of the pandemic. Staying productive while adapting to working from home is challenging, but being able to collaborate with great people across the globe has kept me motivated. I'm currently analysing epidemiological data from Ecuador, where I'm originally from, and helping our collaborators there to maintain their capacity to sequence viral genomes. This work is done alongside our contributions to the COVID-19 Data Working Group and HealthMap. It's an exhausting time to be a virus researcher, but also full of opportunities to learn and feel useful.



Bernardo Gutierrez Granja, DPhil Zoology

My name is Rebekah. I am Pembroke's Welfare and Wellbeing Coordinator and a tutor in Experimental Psychology. Although I miss seeing students face-to-face, it is great that we can continue to support students remotely. Recently I had my first virtual psychology tutorial with students in four different timezones. I feel excited about navigating an 'online course' with such motivated and enthusiastic students. I am enjoying the extra time at home with family. My husband ran a full marathon as laps around our house and I ran a half marathon in our garden. I miss seeing everyone, but love keeping up with the Pembroke Community through emails, online tutorials, and social media.



Dr Rebekah White, Tutor in Experimental Psychology

Collaboration in Lockdown



Academic Director: An Online Term

Nancy Braithwaite, Academic Director - Reflecting now on the last three months, I can hardly believe that when I left Pembroke in March to relocate to my desk in East London, I was worried about what on earth I was going to do during lockdown. And as with tutors and with students, a lot of the answer has been doing everything we did before, but completely differently.

One of our first major tasks was to organise collections, which went ahead at the start of Trinity Term to the open book format that our finalists are now using for their exams. Tutors set collections, the Academic Office put them online and students downloaded the papers, did them at home and sent them back. Tutorials were arranged through emails and Microsoft Teams. Lectures went online, as labs and libraries closed. Exams were moved online, rescheduled or cancelled. We have all got used to checking what time zones our students are in before arranging meetings or tutorials, with exams being taken in a 24 hour time period to account for the different time zones. Some of our students have struggled with resources, connectivity and domestic pressures, as have tutors. We've provided welfare meetings online and study skills sessions.

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A lot of my time has been spent in meetings with colleagues across the university trying to work out what happens next – it seems to be more difficult to start things up again than to stop them. Our ambition is to return to Oxford and to what makes Oxford truly special and unique with face to face small group teaching; but we expect social distancing and other restrictions still to be in place when freshers' week starts in early October and our priority is to protect our staff, tutors and students.

A college is made up of people and place. Without the place, the people have done extraordinary things this term to do 'business as usual' very differently. Our finalists will graduate, even if they can't celebrate outside the exam schools; our open days will have an amazing amount of Pembroke 'content' to showcase the college virtually even if the Pink Panther isn't physically welcoming prospective students into Old Quad. We look forward to next term with nervousness, but also confident in the community to continue being exceptional.



College Librarian: Working from Home

If ever there was evidence that a library is more than the books on its shelves this was provided by Laura Cracknell, our Librarian, and her colleague Alison Walsh during Trinity Term. Forced to work from home for most of the term, with only occasional solo staff visits to the library deemed safe, they continued to support our students in their learning. They provided new mechanisms for requests to be submitted, tracked down resources, scanned chapters, sent digital links to inboxes and despatched physical books to letterboxes. Here Laura reports on their activities.

When we realised we wouldn't have access to the main library collection, we decided that, if a student needed us to buy them a book, we would have our suppliers send it straight out to them. It's something we'd done before on a small scale, for students on years abroad or during vacations, but never as a regular way to connect students with reading material. Since the end of April, we've purchased about 80 books for direct posting.

As soon as we were able to visit the library, we began a scanning and postal loan service, as well as delivering books to students still living in College. We've posted 16 books out, delivered 22 to students in college and scanned 23 sections of books, running into the hundreds of pages. In addition, we've been helping reunite students with books either left in college, or purchased and delivered to college after the students had gone home. Even with postal delays, this seems to have worked well, and has been a vital lifeline for difficult to find or expensive titles.

One thing we've been aware of is that if multiple students need a book, we can't necessarily purchase enough copies for everyone. Where possible, we've also been buying ebooks, although of our fifty or sixty requests, only eighteen have been available and affordable. The Bodleian staff, also working from home, have been incredibly supportive and helpful in tracking down titles and recommending purchases. For Trinity Term, there were lots of emergency access measures in place, massively increasing the number of ebooks students can access. After 30 June, much of that ended so budgeting for next year if restrictions are in place, becomes a real issue since ebook access licences cost three or four times the cost of a print book. It will be more important than ever to work with other Colleges and the Bodleian to get the best value possible, and make sure all students have access to the materials they need.

Throughout the whole of this crisis, Oxford college librarians have been working closely together, to try and get material to students. We've operated an informal scanning service, so that librarians without access to their buildings, or whose requested books are on loan, can still get scans to their students. Faculties have also directed students to us, and we've been making good use of the online reading list platform ORLO to provide online resources across colleges. So far, colleges have supplied about 35 scans to each other via the main mailing list, and more direct arrangements have gone on behind the scenes. Without this kind of teamwork and the support of alumni, it simply wouldn't have been possible to get things out to everyone who needs them.

"In the midst of a very tumultuous and trying time for accessing resources, Laura Cracknell was extremely prompt and kind in locating books for me that were rather difficult to find but essential to my DPhil research. Pembroke College Library not only generously purchased the books on my behalf, but also sent them all the way to Finland. I am extremely grateful for the speed and efficiency with which the Library personnel handled my request."

Thank you to all alumni who contributed to the Pembroke Cares Appeal which was launched to support the adjusted services and new needs of the community in the face of lockdown.

Plant Power

Professor Jon Lovett read Botany at Pembroke from 1976 to 1979. In this article he describes his 40 year journey from being a botanist in the rainforests of Tanzania to leading interdisciplinary international engineering projects.

John Lovett | Chair of Global Challenges, University of Leeds

In my undergraduate days the School of Botany on South Parks Road brewed very good morning coffee with beans from Cardews in the covered market. Eleven o'clock coffee was certainly not to be missed and it was a good time for meeting and discussion. So I was easy to find when Tessa van der Willigen, a third year zoologist interested in ornithology, came to ask me if I wanted to go on an undergraduate expedition to rainforests on the mountains of eastern Tanzania in three weeks' time. Someone had dropped out of the team and Tessa said it would be good to have a botanist to characterise the forests for the birders. I had a summer internship lined up at the Natural History Museum studying lichens with Peter James, but he encouraged me to take the opportunity for field work and asked me to collect some lichens whilst I was there.

The trip to Tanzania led to a diverse career that has taken me all over the world and it certainly wasn't what I'd originally planned. With the benefit of hindsight, I tell my own students that life is unpredictable and unexpected pathways can open without warning, so be prepared to 'seize the day'. My original career plan was to work for the British Antarctic Survey and I'd been putting pieces in place for this. My tutor Vernon Butt put me in touch with Tim Gunn, a former Pembroke botanist, who had spent two and a half years on South Georgia with the BAS, and in 1978 led the botany component of the British Schools Exploring Society expedition to Iceland. I joined the expedition as Tim's assistant and spent the summer looking at plant succession on glacial outwash fans and learning how to traverse glaciers. The lichen study with Peter James was part of this plan as lichens are an important part of the flora of the Antarctic.

But in the late 1970s research funding was changing and it was good to be nimble. Margaret Thatcher became prime minister in 1979 and cuts were looming. Getting experience in the tropics seemed a more sensible option than spending two and a half glorious years in the Antarctic - and then returning to an economy in which lichen identification skills were not in high demand. The Curator of the Oxford Herbarium, Frank White, allowed me to spend some time getting to know some of the trees of Tanzania by looking at specimens in the Forest Herbarium; and the Sherardian Professor of Botany, Bob Whatley, gave me the sound

advice that "if you want to get anywhere in science you have to become a specialist in something that no-one else is a specialist in".

If the forests are to be conserved and the thousands of rare species protected, then some practical engagement and implementation is needed

So I spent the Thatcher years in Africa becoming a specialist on the remarkable rainforests of eastern Tanzania. Tanzania was undergoing an economic crisis at the time, and field work was not easy, so I joined the select band of a handful of biologists conducting research in the area. Initially I obtained funding for the work by organising a series of expeditions with grants from the Royal Geographical Society and Royal Society. Following the short-term expeditions I was asked to lead the two year World Wildlife Fund Tanzania forests and primates project, after which I joined the staff of the Missouri Botanical Garden to head their Tanzania programme. I camped in the forest for months at a time, gathering quantitative data on tree species associations and collecting herbarium specimens. The collections yielded more than a hundred new species, and several new genera, of plants. Whilst visiting Oxford on annual trips back to the UK I collaborated with the environmentalist Norman Myers on the analysis that resulted in the Tanzanian forests being among the world's top twenty-five biodiversity hotspots. I used the quantitative tree plot data for my PhD at the University of Wales; and later it was included in the database held at the University of Leeds, where it has contributed to meta-data analyses for a series of papers in journals such as *Science and Nature*.

But just 'knowing' about tropical rainforests isn't enough. Living in wild nature whilst doing research is fulfilling and exciting; and it's great to be a co-author on some amazing scientific papers, but if the forests are to be conserved and the thousands of rare species protected, then some practical engagement and implementation is needed. By the late 1980s the forests

were being recognised for their biodiversity and receiving increasing international attention. The Tanzanian government asked me to help create management plans for the forest reserves. This resulted in another change in career. Although I could speak Swahili well and had a good understanding of rural Tanzanian life, the skills developed as botanist and ecologist were of limited use when talking with villagers and officials about forest management: I had to learn about law and economics.

At that time, in the early 1990s, Tanzanian forest law was the same as that in use by the British administration of Tanganyika before independence in 1961. This gave rise to a strange legal time warp. Step inside the forest reserve and you were in a legal regime mostly derived from a British Forest Ordinance from 1933 and designed for colonial-style administration. Step outside and you were in post-independence 'Ujamaa' African socialism.

A single pace across the forest reserve boundary represented a legal leap in history. This anachronism gave rise to disparities in rights of access to forest land and resources, and eventually the law was changed to be more responsive to community needs.

In 1992 I moved from Tanzania for a two year post-doctoral fellowship at the University of Copenhagen to work with some of the biologists with whom I'd been collaborating during the 1980s. From there I took up a lectureship at the new department of environmental economics at the University of York and started to expand my new-found interest in institutional economics with work on forest law and community use in Nepal, Mexico and Australia.

Tanzania kept calling me back and whilst at York I led the environmental assessment of a hydropower project at Kihansi in the southern part of the mountains where I'd lived for so long. The work involved frequent field trips and discovery of yet more species new to science in the forested gorge affected by the scheme. This work on a major energy project also started my next career shift. At around the same time as the Kihansi project I became part of a Conservation International team researching the potential effects of climate change on

biodiversity. The dramatic potential impacts shown by our models demonstrated the imperative need for change in the way people use both land and energy. As in the lesson I'd learnt about needing to understand economics and law when designing forest management plans, I now realised I needed to work with engineers to be part of the effort to halt climate change through a transformation to sustainable energy.

The next career change took me to the University of Twente in the Netherlands where I had been offered a professorial chair heading the technology and sustainable development group in the faculty of business administration. I was now a long way from lichens in the Antarctic. The group had major research programmes on the role of both land use and renewable energy in the mitigation and adaptation to climate change. It was six exciting years during which I attended UNFCCC meetings in Poznan, Copenhagen, Bonn, Doha and Cancun to present our work to policy makers.

The world is undergoing an energy transition in both generation and supply

In 2012 I finally moved back to the UK to take up the Chair in Global Challenges at the School of Geography in the University of Leeds. In the curious way that that fate operates, the move brought together the various strands of my career: I was reunited with the data I'd collected in the forests of Tanzania, which is being curated in the huge collaborative 'Rainfor' database at Leeds that is being very actively used for regional and global analyses on tropical rainforests.

I brought with me the work on renewable energy and established a collaboration with engineers at Leeds to create three major interdisciplinary international projects. One is funded by the Royal Society and involves capacity building for renewable energy in Uganda, Tanzania and Congo-Brazzaville. The second is funded by the EPSRC and is developing a tool for designing mini-grids that integrates socio-economic information with generation potential and power demand. The third is funded by the BBSRC and is exploring the possibility of using the invasive water hyacinth plant as a source of bioenergy in India and Uganda.



Professor Lovett with colleagues in Tanzania

I've also been reunited with Kew through Kathy Willis, who was formerly Kew Director of Science, and is now Principle of St Edmund Hall and Professor of Biodiversity in the Department of Zoology. Following restructuring of Kew's scientific organisation and creation of a new Natural Capital and Plant Health department, Kathy invited me to join Kew as a Research Fellow to develop bioenergy as a research topic. In 2019 we held a one day international workshop at Kew on 'Plant Power' to bring together our renewable energy project partners; and this year bioenergy is a theme in Kew's flagship 'State of the World's Plants' conference.

The world is undergoing an energy transition in both generation and supply. Renewable sources of energy from solar, wind, wave and biomass are now cost-effective and integrated into national and global energy strategies. At the same time a revolution is taking place in how electricity is distributed with 'smart' systems and mini-grids. New technology has enabled local and small scale generation, placing Sustainable Development Goal 5 "Ensure access to affordable, reliable, sustainable and modern energy for all" within reach. Reducing greenhouse gas emissions and shifting to regenerative land uses will help stem climate change and loss of biodiversity. Collaborating with economists and engineers all over the world seeking solutions to one of the greatest global challenges was not what I expected to result from that cup of coffee with Tessa in 1979 and it's been a long and fascinating journey.

Eco-Robotics

Pembroke Fellows Dr Roberto Salguero-Gomez (Ecology) and Professor Nick Hawes (Engineering) have brought together their expertise to revolutionise ecological field work.

Roberto Salguero Gomez & Nick Hawes



Robot AE25 (for Autonomous Ecologist unit 25), an autonomous ground vehicle, has finished charging its battery. It is sitting in a solar-powered field shelter in the heart of the Karoo Desert, South Africa. Overnight, it off-loaded data from yesterday's biodiversity survey of a region 5 hours away from the closest town. AE25 now checks, contrasts, and validates its predictions regarding how its surrounding environment, plants, and animals have responded to yesterday's weather. This updated knowledge allows it to update decisions on the best way to collect data for today's task. Instead of driving south to a protected reserve, it should travel west to monitor a cluster of sites that have experienced a severe drought for several weeks. At the crack of dawn, AE25 "wakes up" and leaves its solar-charging dock and heads out. Using its radar, AE25 determines its position relative to the surrounding hills, rocks, and dunes, and slowly follows a previous path across the desert, occasionally stopping to plan around newly

encountered obstacles, including fallen branches, temporary streams, and the occasional baboon that strays across its path. AE25's wheels and heavy base mean that it cannot drive on the first target site without damaging the endemic, fragile minuscule flora.

Therefore, AE25 deploys a UAV (Unmanned Aerial Vehicle, i.e. drone) with a hyperspectral camera to complete a low pass over the target site to gather data. Once this task is complete, the UAV lands on AE25 and they head to the next target site. The usage of hyperspectral imaging allows the ecologists back at Oxford remotely receiving AE25's data to evaluate the effects of the drought on the community's hydraulic stress and to identify camouflaged species. The same task is repeated until AE25 notices that its battery has been draining faster than predicted (the drought has made the soil more brittle, and thus provides greater resistance). AE25 cannot complete the final inspection without risking

getting stuck in the middle of the desert, and so it decides to head directly back to the shelter where it starts charging and off-loading the day's data.

Whilst AE25 was out in the field, software was running on the computers in its shelter, quantifying recent changes in cover of endemic and invasive species. These data, which would be too expensive to be collected by humans, are now entered into the ecological model that generates field tasks for subsequent days. Whilst AE25 charges after another successful day, a satellite link uploads the data from the day's run. These data are then shared with AE24 and AE26, AE25's neighbours, across a network of 50 robots that cover over 100km² of land. Every night, the processed data collected by every autonomous ecologist unit are transmitted to Oxford, where the team of information engineers and ecologists use them to monitor, understand, and predict changes in biodiversity due to climate change.



Endemic plant (next to index finger) in the Karoo Desert, perfectly camouflaging itself against the background of rocks and sand, thus preventing it from being identified and eaten by herbivores.



Professor Salguero-Gomez piloting a drone (small dot to the right of the mountain peak) in the Desert (South Africa) to collect information regarding vegetation responses to droughts.

Science fiction? Perhaps, but the same thing was said of smart-phone technology or virtual reality headsets. Indeed, this is the very real research vision of two Pembroke Fellows: Rob Salguero-Gómez and Nick Hawes. Rob is an expert in ecological modelling of populations of animal and plant species in harsh environments, and Nick in artificial intelligence (AI) for robot behaviour. After discovering an overlap in their interests over an alumni event at Pembroke, they are now exploring ways in which these interests can grow into a collaboration which could change the face of ecology and robotics. Rob has spent the last few years manually flying aerial robots (i.e. drones) in order to collect data from ecological field sites which are often days away from the nearest major population centre. Nick has studied how autonomous robots (i.e. robots that don't require human control) can be deployed for long durations in work settings such as

offices, care homes), and even college open days. Putting their heads together, this leads to the question of how autonomous robots can be deployed for long durations (weeks, months, or years), at remote ecological sites, in order to gather vast data in a cheaper, more efficient and less error-prone manner than to collect them manually.

To kick-off their collaboration, Rob invited Nick and a collection of researchers from the Oxford Robotics Institute to one of the field sites where he is conducting ecological research locally: Wytham Woods. Wytham Woods is one of the oldest ongoing biological research sites in the UK and in the world. This was an opportunity for the team from the Department of Zoology to understand the capabilities of a number of different autonomous ground robots, including a Clearpath Husky and Jackal, and ORI's unique Hulk platform. It was also a chance for the team from the Department of

Engineering Science to understand the constraints of operating at an active ecological field, and what kind of data the researchers require.

Ecology, the science that examines the relationships of organisms with other organisms and with the environment, represents the next frontier in the solution to many of our current societal challenges. Food provisioning, climate regulation, and clean water all emerge as a direct function of the quality of the ecosystems that surround us. The need to better understand and predict responses of ecological systems has led ecologists to become more quantitative. Indeed, to study ecology nowadays typically means to study a lot of statistics, mathematics, programming, etc. While this has greatly improved the speed and efficiency with which we can analyse ecological data, the acquisition of data has not advanced as fast. It is of course true that we now have access to satellite data at an



Robot Betty working at the Transport Systems Catapult in Milton Keynes as part of Professor Hawes's previous EU project, STRANDS. Photo Credit: John James/University of Birmingham.

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unprecedented resolution. However, certain ecological systems require data gathering that cannot be achieved by orbital observation. A significant number of ecologists have resorted to a brute-force method: we go to the field, we carefully observe the different attributes that we are interested in to describe the ecological system, and then we have to go back to the office, digitise them and analyse them. Most ecological data collection is inefficient: it takes a long time, it is error prone (because it is done by humans, and we are not perfect), and it is expensive because it requires training field ecologists on very specific aspects of the biology of the system, and because, of course, those people have to make a living out of the activities they engage in.

The usage of technology means a potential new revolution in ecology. It

will allow us to say goodbye to paper and pen, long-hours in the rain/hot sun, and accidental typos while annotating observations. We see the application of robotics (across land, sea, and air) as the next step in our ability to understand and predict how ecological systems respond to various disturbances. These disturbances (e.g. climate change, habitat degradation/fragmentation, pollution) have already exposed the immense majority of human settlements to significant physical and mental risks, as well as the drastic decline in the ecosystem services that these systems provide to humans.

In summary, the dream of forming a symbiosis between ecology and robotics is closer than ever before. Ecological settings bring robotics real-world challenges which, if successfully navigated, could then be applied not

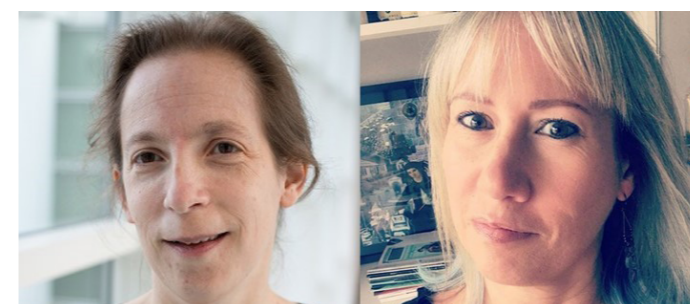
just to those settings, but also to other settings such as cities and farms. Robotic technologies bring to ecology the unprecedented opportunity to monitor and predict almost real-time how habitats and its species may respond now and into the future to human-led disturbances. Their unification into eco-robotics could revolutionise both fields of research, and also produce multiple benefits to society and biodiversity.



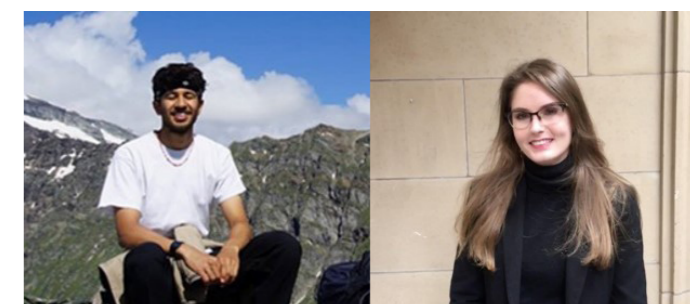
A view of the research group from above at Wytham Woods, taken from a drone. The shot also shows the RainDrop experiment.



Robots from the Oxford Robotics Institute at Wytham Woods, (L-R), Hulk, Husky, and Jackal. Prof Hawes (4th from right) and Professor Salguero-Gomez (1st from left) are also shown.



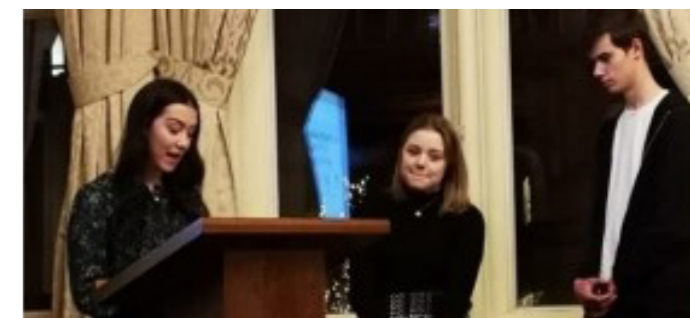
Alumnae Dr Helen Margolis MBE (1987, Physics) and Natasha Finlayson OBE (1982, Modern History) were both recognised in The Queen's Birthday Honours List 2019. In the 2020 New Year list, awards were made to Andrew Jowett (1980) Professor Ed Hawkins (1995) and Oz Clarke (1967).



The College created 8 new graduate scholarships ahead of the 2019-20 academic year, thanks in large part to the generosity of alumni donors. Pictured: Audrey Driscoll and Siddharth Kumar, two of the recipients.



Pembroke celebrated the 40th anniversary of the admission of women students into the College with a special art exhibition and a lecture by Anna Murphy (1990, English and Modern Languages). This year's display of photographic portraits in the College Hall featured six other Pembroke women.



In November 2019 Pembroke Co-launched the Goldsmiths' Sutherland Centre for Philosophy and World Religions. A partnership with Manchester University and Ashton Sixth Form College, the Centre provides academic seminars and events for year 12 pupils in Greater Manchester and Cheshire.



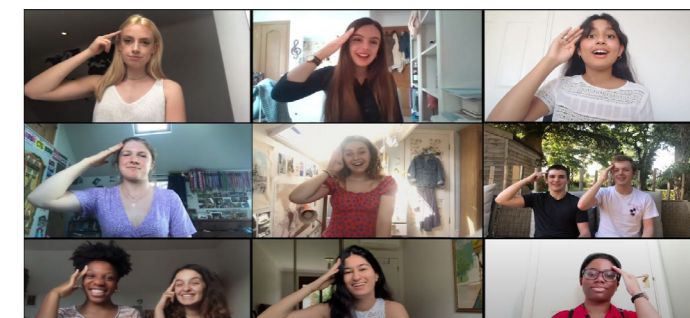
Fellow and Tutor in Chemistry Professor Ben Davis was awarded the Davy Medal by the Royal Society in recognition of his outstanding contributions to science.



During the College and national lockdown in April, Pembroke's catering team began a scheme to deliver regular meals to over 100 homeless people in Oxford, with the successful initiative lasting throughout the summer.



Dr Ushashi Dagupta, the Jon and Julia Aisbitt Fellow in English, recently released a book focusing on Charles Dickens and his works on tenancy, titled Charles Dickens and the Properties of Fiction: The Lodger World.



Diversity week was held online by the JCR this year. Notable highlights included pre-recorded chats with alumni, a race roundtable discussion, and virtual sign language lessons.

Building Global Partnerships

The Quill Project's global collaborations and multidisciplinary research are expanding Pembroke's horizons and enabling fresh insights into some of the foundational legal texts of the modern world.

Dr Nicholas Cole | Senior Research Fellow



The Quill Project is one of Oxford University's most innovative digital humanities projects. We have designed and continue to develop a software platform that transforms the study of legislative history through a combination of new approaches to document representation, visualization, search and analysis of the information contained in legislative journals, and documentary editing. I am proud of these technological innovations and the historical insights which have resulted, but also of our unique and collaborative model of research, which provides opportunities for students from a wide variety of backgrounds to engage in international partnerships on substantive research questions.

It all began in Pembroke in 2015 through the generosity of our initial donors. My early research had focused on American political thought — especially that of Thomas Jefferson, but ever since my doctoral research I had found the imprecision with which scholars discussed the writing of America's constitutional law frustrating. Part of the problem was the nature of the records themselves, which describe hundreds of tiny changes to wording—sometimes separating the decision on particular language from the original proposal by days or weeks. I had long thought that the minutes (both official and unofficial) of the 1787 Federal Constitutional Convention would prove more intelligible, and more useful outside academia, if a computer system allowed users to explore the evolving context of each proposal and decision. Readers needed to be relieved of the challenge of trying to reconstruct in their imagination the implications of every suggested change and every vote taken.

Joined by a colleague from Oxford's e-Research Centre, Alfie Abul-Rahman, I began to build the initial software platform. I adapted techniques used in online messaging platforms to create a kind of 'track changes for historians' technology, while she worked on the web user interface.

Things took an unexpected turn when I received an invitation from Utah Valley University (UVU). It turned out I shared a

mutual friend with then-President of UVU, Matthew Holland. He hoped I would visit their newly opened Center for Constitutional Studies, one of his favourite projects. He wanted the Center to develop a clear research agenda — could working with the Quill Project be part of that? I had never intended to visit Utah, a state admitted long after the founding era of American history that had been my focus. I had no idea what to expect.

UVU is, in almost every respect, the opposite of Pembroke and Oxford. It is an 'open-enrollment' state university with a non-residential campus.

UVU is, in almost every respect, the opposite of Pembroke and Oxford. It is an 'open-enrollment' state university with a non-residential campus. Its university status only dates back to 2008, although it grew out of an earlier vocational school. It continues to run vocational as well as academic courses, and offers associate degrees (typically a 2-year qualification in the US) alongside BA and Masters courses. Its admissions policy is completely open and there are few real limits on student numbers. America's only legal deposit library — and equivalent of the Bodleian collection — is 1800 miles away.



Holland was keen to expose the students at UVU to opportunities to learn from research projects — 'engaged learning' was the watchword of the day. It is a concept familiar in science undergraduate degrees, many of which incorporate a fourth year embedded in a research team, but much rarer in arts subjects. Could UVU students help with the Quill Project's work?

I confess that I was sceptical — but intrigued. Building the online editions would require not only development of our software platform, but also people to carefully and painstakingly translate the surviving manuscripts into a digital model of the negotiations. There would be no room for error. The idea of using undergraduate students for the task was a startling proposition, especially students with such a different educational background to the typical Oxford student.

36% of the UVU student body are 'first-generation' university students, some are the children of illegal immigrants, 51% work more than 20 hours a week to support their studies, and 80% have at least some employment alongside studying. Most arrive at UVU focused on vocational rather than academic subjects. Yet the work they have contributed to the Quill Project has been of the highest quality. A donor funded paid

positions and over time we have been able to expand the team. As a result, many students have had the opportunity to work with us rather than taking other employment, gaining valuable experience and the ambition to go on to higher degrees. More importantly, they have made a substantive contribution to our understanding of the history of American law.

The first few students helped us to test ideas for the user interface, and explored different ways to represent the source material within our model. It was tedious and frustrating, but essential. The result was that by the summer of 2016 we had created a well-tested platform and methodology, which enabled Oxford graduate Grace Mallon (now writing her DPhil), to work through the summer and produce our first proof-of-concept publication: a model of the 1787 negotiations drawn from published sources. Without the work of UVU's students over the previous months, that work would have been impossible for another year.

What next? Students at UVU were eager for a new project, and one they could feel real ownership of. I suggested they have a look at the state archives relating to the state constitutional convention held in Utah in 1895 — perhaps that would be another good application of our technology. In truth, I had little idea what they would find. Although America has written 235 different state constitutions for its 50 states over the last 244 years, few historians have ever looked at the circumstances of their creation; the archives relating to most states have had no more than the cursory attention of documentary editors. Like many, I thought that state-level constitutions would prove to be easily negotiated and of little interest.

I could not have been more wrong. State constitutions govern many more aspects of life than the Federal constitution, and it transpires that the debates as they were written and rewritten were every bit as fraught as the Federal debates, if not more so. Each state defines its own bill of rights, places different limits on the legitimate actions of government, and allocates power differently. Constitutional conventions at state level have been sites where some of the most fundamental policy questions had been litigated — and work by students in the archives persuaded me that this should become the longer-term focus of our research as a centre.

Working with the surviving records was not easy: reconstructing the workings of the 1895 Convention required archival work as detailed and extensive as many PhD projects. Students tracked down newspaper materials when the official records proved insufficient, sometimes taking weeks to settle some small point of detail. In 2019, after a dozen students had worked on that project, we published the result of their work, to the interest of

members of the legislature and state supreme court. As a result, UVU's CCS, now led by Prof. Rodney Smith and Scott Paul, has won a prestigious Digital Advancement Grant from the National Endowment of the Humanities to expand our archive relating to Constitution Writing in the American West — while a separate group of students works with us on the congressional debates between 1860 and 1871 that ended slavery and resulted the 13th, 14th and 15th Amendments.

This initial collaboration proved so successful that we have been able to expand our work to include both new material and new collaborations.

This initial collaboration proved so successful that we have been able to expand our work to include both new material and new collaborations. Pembroke alumnus Prof. Paul Carrese is directing a project at Arizona State University using our software and methodology to trace the history of Arizona's constitutional development. This summer four interns from French universities are working with us on a project that charts the writing of the 1789 'Rights of Man and the Citizen' French Revolutionary statement of human rights. Meanwhile students from Harvard, Stanford and Brandeis are joining forces to examine the records of the Massachusetts 1779-80 constitutional convention, and a team in Australia have submitted a grant application to work with us on Australia's constitutional history. Colleagues at SOAS and in India have helped us to frame an ambitious project that (if we can win funding) will study the three-year long process that wrote a constitution for the newly independent India. The contribution of undergraduate students has grown too — helping us to design and deliver training courses for court and legislative officials as well as classroom materials for high school teachers.



The core of the Quill Project remains its focus on expanding our knowledge of constitutional and institutional development, through a combination of traditional archival and editing work and the development of new digital approaches. The surprise has been how integral the work of a diverse group of undergraduates has become. They have proved that the humanities can indeed benefit from student contributions to long-term, collaborative research projects, not merely as 'data-entry' assistants, but as colleagues. I am enormously grateful for their dedication, care, and intellectual engagement with the project. Because they had scanned so much material from state and Federal archives in advance, not even COVID-19 has derailed progress.

More than 40 people have now worked on the digital editions that we publish, from many different backgrounds. Through Oxford's micro-internship scheme, Pembroke students have helped with highly experimental projects to refine our technology and experiment with the application of AI, and several have joined the project as one-year research assistants after graduating, roles enabled by the generosity of our supporters, and that we would like to expand. At its inception, we never imagined student involvement, and certainly not this level of collaboration, nor the international nature of the project. But it all now seems a natural and vital part of the way we work.

We are very sad that Dr Rodney Smith, director of the Center for Constitutional Studies at Utah Valley University and a wonderful friend and colleague, passed away in July after sudden and unexpected complications arising from cancer treatment. A tribute to him appears at www.quill.pmb.ox.ac.uk/quill-news/2020/7/27/rodney-k-smith. He will be very greatly missed.

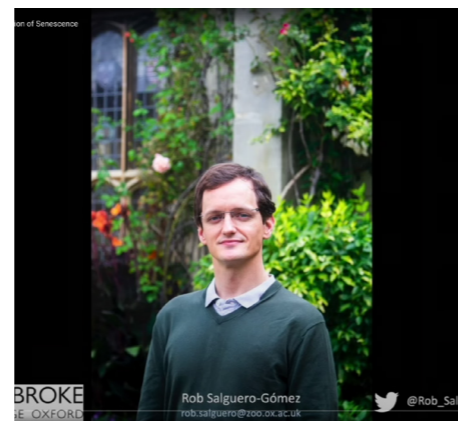
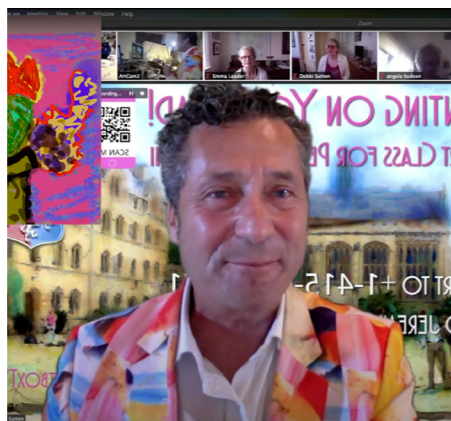
The Pembroke Network

with Andrew Mitchell | Alumni Engagement Officer



Launched early in lockdown, the Development team have brought together a selection of information, events, lectures and much more on this new digital platform. The aim is to help alumni and friends stay connected, entertained and inspired. Visit the hub page on our website to find out more and contact Andrew Mitchell and the team if you have content to contribute.

www.pmb.ox.ac.uk/connects



In Week 8 of Trinity Term, Pembroke hosted Careers Week - a number of virtual events, online discussions and the launch of the Pembroke Links platform.

The main event was a Zoom discussion entitled 'Careers in unsettled times: succeeding against the odds', attended by more than 100 students and alumni. Panelists included Paul Forster (1986), co-founder and former CEO of Indeed, Tazeen Hasan (1983), a specialist in gender equality and

development at the World Bank, and Peter Jones (1980), the Chief Operating Officer of the Foreign and Commonwealth Office. The event was moderated by Gabriel Schenk (2010), co-founder of the Tolkien Lecture series here at Pembroke. You can watch the replay of the discussion at www.pmb.ox.ac.uk/content/careers-unsettled-times-discussion.

Careers Week also saw the launch of Pembroke Links (<https://www.pmb.ox.ac.uk/content/pembroke-links>). This web platform provides access to careers-focused video resources, including interviews of alumni by students and talks produced by alumni offering career advice to students about various

professions and occupations. Featured alumni and others who have offered to be career Mentors can be contacted by joining the Pembroke College Mentoring Group (<https://www.linkedin.com/groups/10490654/>) on LinkedIn.

The next Pembroke Careers week will take place in Week 8 of Michaelmas Term 2020. In the meantime, all the careers resources are available to alumni and students at Pembroke Links. If you are interested in being a Pembroke Career Mentor please Email our Alumni Engagement Officer, Andrew Mitchell. Thanks to everyone who has taken part so far.

Pembroke Alumni Advisory Board

As the College approaches its 400th Anniversary in 2024, we want to retain and enhance our reputation as a welcoming body for undergraduates, post-graduates and alumni – as well as teaching and non-teaching staff. The College can and will provide mutual, life-long support for professional, personal, pastoral and academic development.

The Alumni Advisory Board (AAB) has been in place for some years, but recently has been re-energised with additional/new members, to focus on the achievement of those ends.

Current Chair, Steve Atkinson (1973), emphasises that "the purpose of the AAB is to promote the College as a 'community'. We are seeking to re-engage and build

relationships with Alumni and their families, particularly those not previously involved with the College, by continuous communication and attractive events. By that means we aim to secure a high and improving reputation for the College and pride from Alumni."

"The role of Alumni Ambassador', outlined below, will be crucial to the success of this initiative. I encourage you to read the details on our website and look upon this as a positive, non-financial means of 'giving back' to the College. We look forward to hearing from you."

More information at: www.pmb.ox.ac.uk/node/4546



Steve Atkinson – Chair of the College Alumni Advisory Board

YOUR COLLEGE NEEDS YOU BECOME A PEMBROKE ALUMNI AMBASSADOR

Pembroke has a long history of engaging with Alumni outside Oxford. Many Alumni also retain contacts with peers from their matriculation year, from shared academic and professional interests or as a result of adjacency of residence. The College is looking to build on this through Alumni Ambassadors, who will set up and facilitate Alumni Groups; based on Year, Subject, Specialist Interest or Region.

If you are 'passionate about Pembroke College' and the contribution it can make to all those with a connection to it – and have some time to devote to putting that passion to practical use – please contact Andrew Mitchell, our Alumni Engagement Officer, about becoming an Alumni Ambassador.

The College Development Team will help you set up and develop your Alumni Group. We will provide you with the *Pembroke Alumni Ambassador Toolkit**, which has been created by the AAB to support and guide you through the process.

By giving a commitment to be an Ambassador, you will be a key point of contact for and between Pembroke College Alumni, but will benefit from dedicated support in relation to: our communications network and promotional material; guidance on costs and logistics; an Annual Conference for Alumni; and in-depth briefings on College matters.

You will be expected to commit dedicated time to the role and be familiar and actively engage with the development of the College's mission and strategy, by providing opportunities for Alumni to engage with the College and to remain connected with each other through activities appropriate and requested by your group.

For more information email Andrew Mitchell: andrew.mitchell@pmb.ox.ac.uk





WHAT WILL YOUR LEGACY TO PEMBROKE BE?

If 2020 has taught us anything, it is that we cannot predict the future. Without the generosity of alumni and rigorous financial management over the last two decades, Pembroke's ability to weather the current crisis would be severely compromised – in fact, our endowment, the assets we invest long-term to protect the College's future, would be worth less than 1/10th its current value.

By leaving a gift in your Will, your legacy will not only contribute to Pembroke's financial resiliency to meet future challenges; it is also an extraordinary opportunity to help future Pembrokiens fulfil their hopes, dreams, and full potential.

For more information, contact development@pmb.ox.ac.uk or call 01865 276478.

Residuary Legacy

Leave a portion of your estate after you have provided for those closest to you.

Pecuniary Legacy

A fixed sum of money.

A named item (specific legacy)

A specific gift (such as a piece of artwork, property or collectible item) that can be sold or will generate an income.

Reversionary legacy

This gift provides for your family and other loved ones and then subsequently benefits the College.

Recently moved house or updated your email address?
Please let us know the best ways to stay in contact by emailing us.

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