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THE SCHOLAR

A PICTURE IS WORTH A THOUSAND WORDS

UNIVERSITY OF CAMBRIDGE

IN THIS ISSUE

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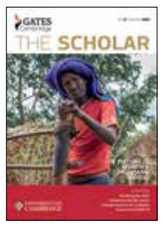

The Scholar, 2020

Editor-in-Chief: Reetika Revathy Subramanian
2019, India, PhD Multi-disciplinary Gender Studies

Assistant Editor: Grant Simpson, 2017, USA, PhD Chemistry

Deputy Editor: Shahriar (Shawn) Zamani, 2019, USA, PhD Medical Science at the MRC Cancer Unit

Design: H2 Associates, Cambridge

Gates Cambridge Trust Advisors:
Jim Smith, Programme Director
Mandy Garner, Communications Officer

The Scholar is the publication of the Gates Cambridge community. Articles that offer a window into the lives and work of Gates Cambridge Scholars and Alumni or articles that tackle large interpretive questions relevant to the Gates Cambridge mission are particularly encouraged. Highly focused contributions are welcome, but preference will be given to submissions that are of interest to a diverse cross-section of readership in more than one discipline of study. Contributions are subject to editorial approval. Ideas expressed are those of the authors alone.

Write to us:
We welcome your comments, suggestions and questions.

Reetika Revathy Subramanian, Editor-in-Chief
eic@gatescouncil.org

COVER IMAGE: © ALEXANDRE L'HEUREUX

Editor's note

Dear Reader

On behalf of the editorial team, I welcome you to the 2020 issue of *The Scholar* magazine. It has been a difficult road this year, and I hope we continue to stand by each other through these unprecedented times.

Within the pages of this magazine, we have showcased merely a subset of the diverse and meaningful work that Gates Cambridge Scholars, past as well as present, have pursued during and after their time at Cambridge. Every submission mirrors the community's thoughtful leadership and exemplary commitment to build a just future for all. We received a wide range of pitches this year, more than we possibly had space to include.

It is also a year of several firsts for *The Scholar*. We are going entirely digital from this year on. Further, in keeping with the larger theme, *A Picture is Worth a Thousand Words*, we have included a set of compelling photo essays. Alexandre L'Heureux takes us on board a photojournalistic journey into the inclusive innovation ecosystem of Bahir Dar in Ethiopia. Rodrigo Córdova Rosado presents snapshots from the American Southwest of walking through the incredible archaeoastronomical structures left by the Chacoans from the 9th to the 12th centuries CE. Oliver Antczak digs deeper into the Colonial erasure and the resistance of Indigenous identity of communities living on Bonaire island in the Southern Caribbean. Jessica Fernandez De Lara Harada travels to the main cities of settlement for Japanese migrants and their descendants in Mexico to unearth their long and buried histories.

In the *Telling the Tale* set, we have included interviews with passionate and strong-willed scholars and alumni, who have expanded their academic pursuits to pursue socially relevant engagements on the ground. Sandile Mtetwa shares her journey of setting up and building Simuka-Arise Initiative, an NGO that advocates for young women's empowerment in Zimbabwe. Theo di Castri traces his experiences of co-founding Catalyst, a cross-border educational initiative that addresses the War on Drugs in the Americas. Collin Edouard shares his experiences of confronting everyday racism in Cambridge, which pushed him to set up #SpeakOut, a public campaign and solidarity group.

This issue also contains a set of perspective pieces shared by scholars and alumni negotiating challenging global problems such as climate change, fragile nation states, and resource inequality. Stephen Lezak eloquently proposes a third way of climate policy in the High North. Kim Van Daalen advocates for the need to reframe climate action to move from an abstract, future problem to a people-centred, personal issue. Jacqueline Siu cautions us on the ways in which non-experts' understanding of immunology is hampered by the jargon of the field.

I extend my warmest gratitude to our contributors, the editorial team including Grant Simpson and Shawn Zamani, and our advisors at the Gates Cambridge Trust, particularly Mandy Garner, for making *The Scholar: 2020* possible.

Editor-in-Chief
Reetika Revathy Subramanian
2019, India, PhD Multi-disciplinary Gender Studies

"INNOVATION BY, WITH AND FOR THE RISING BILLIONS"

Alexandre L'Heureux (2018) takes us on board a photojournalistic journey through Bahir Dar in Ethiopia, where young Ethiopian entrepreneurs have been innovating to overcome pressing problems faced by their communities.

Alexandre's research supported the collaboration between the Centre for Global Equality (CGE) and the Bahir Dar Institute of Technology (BIT) to enable inclusive innovation – innovation by, with and for the rising billions – in the region.

1 Ethiopia has one of the fastest-growing economies in the world. However, one quarter of its population still live in extreme poverty. Bahir Dar is the capital of the Amhara Region, which is home to 26 million people, mostly based in rural settings. Photo 1 shows a farm in a rural area near Bahir Dar. The owner of this farm, in partnership with a researcher from BIT, has installed an irrigation system powered by a solar panel.

2 The solar panel powers a pump that sucks well water to a tank. A drip irrigation system then precisely releases water directly to the root of the plants to avoid wastage. With climate change, Ethiopian farmers are becoming more vulnerable to unpredictable precipitation and droughts. Sisay Asres, a BIT PhD researcher, is investigating how to implement environmentally sustainable conservation agriculture techniques like this one to increase the climate resiliency and productivity of small farms.

3 Sisay collaborates closely with the community. For instance, pictured here is Ato Girma Yenehun, a local farmer trained by Sisay to be his monitoring assistant, record daily measurements, and disseminate conservation agriculture techniques to other farmers. Community service is mandated to all university researchers in Ethiopia. As a result, partnerships between researchers and local communities are encouraged and they promote the use of indigenous knowledge and technology in solving pressing problems.

4 Hareg Mesfin (pictured left in the photograph) co-founded and runs Zenar, a fashion business specialised in leather bags, shoes, and accessories. She employs nearly twenty people, mostly women. BIT runs a female innovation support group to lift the cultural and institutional barriers that too often discourage women innovators. The group creates a safe space for female students who aspire to become entrepreneurs. Hareg is often invited to speak to the group and inspire them to follow her journey.

5 Kaledawit Esmeleatem runs a company that manufactures electronic devices to address local needs. For instance, he is developing a solar power home system for low-income, off-the-grid rural dwellers. His factory is located in a governmental micro and small enterprises special zones. He is also leading a group of entrepreneurs in his zone to build a maker community that will encourage knowledge and skills sharing and train the local youth.

6 Getu Alemayehu runs a company specialised in eco- and health-friendly *injera* electric and biogas cookstoves. *Injera* – a sourdough-risen pancake – is the staple food of Ethiopia. Cooking accounts for 90% of all household-level energy in Ethiopia in which 50-75% is for *injera* baking alone. *Injera* is typically baked on biomass-fuelled cookstoves that produce hazardous smoke. With 95% of Ethiopians relying on biomass fuels, *injera* baking is a significant source of deforestation. Getu works to solve this.

Alexandre L'Heureux
2018, Canada, MPhil Engineering for Sustainable Development

The Bear in the Room

Stephen Lezak [2019] proposes a third way for climate change policy in the High North.

Last February, in Siberia, a stout museum guide gestured with a slim baton beneath a towering skeleton of a bear. She spoke in a stern voice as she reached the baton high above her, toward the bear's collarbone. *They are most ticklish at the neckline*, I imagined her saying in Russian.

The bear in the room belonged to the natural history collection of the local museum in Khanty-Mansiysk, the modest capital of a province that accounts for roughly half of Russia's annual oil production. I had travelled there along with 30 Russian and UK-based early career researchers for a weeklong workshop on Arctic environmental change. To the north of us was the Yamal Peninsula, a finger shaped protrusion into the Arctic Ocean containing Russia's largest petroleum reserves.

In the past decade, private industry and the Russian government have invested heavily in developing these resources. The flagship developments are a new port high above the Arctic Circle and a fleet of nuclear-powered icebreaking ships that will allow liquified natural gas (LNG) to be carried across the Arctic Ocean to consumers in Europe.

The very fact of this development is a prime example of infrastructural opportunism in a climate-changed world. Decades ago, Arctic shipping was largely left to explorers and militaries. In centuries past, these sea routes in the High North were near-mythical places; the Northwest Passage captivated explorers for 300 years before the first successful navigation took place in the early 20th century.

Navigating the open ocean in these latitudes is difficult and dangerous. Every winter, sea ice covers the surface of much of the Arctic Ocean, blocking passages between ports. Icebreaking vessels are driven through frozen waters to temporarily break up the ice to permit other ships to transit through the chewed-up remnants they leave in their wake. Still, hazards remain. The environmental consequences of a disaster in these waters would be magnified by a multitude of environmental factors, including the fragility of northern ecosystems and the remoteness to other maritime infrastructure. In the months since my visit, 150,000 barrels of diesel were spilled into the Russian Arctic Ocean – roughly half the volume of the infamous 1989 Exxon Valdez spill.

In recent years, climate change has made these waters much more accessible (and attractive) to commercial developers. The area of Arctic sea ice at its summer minimum has declined by nearly 50 percent since measurements began in 1979. In 2017, a Russian LNG tanker became the first vessel to sail the Northern Sea Route from Norway to South Korea without an icebreaker escort, setting a speed record along the way.

Climate models forecast that the Arctic Ocean may be ice-free before 2050, suggesting that high latitude shipping could become commonplace before long. This prospect raises two key concerns among environmentalists: first, that increased shipping would inevitably result in a maritime disaster; and second, that the ash-laden emissions from the fuel used in large vessels, accelerates the melting of ice by making snowfields and glaciers absorb more sunlight.

While government groups such as the International Maritime Organization continue to debate these issues, private corporations have acted independently to limit commercial vessel traffic in the Arctic. In the past two years, three of the world's five largest shipping companies have elected to forego Arctic shipping altogether. This private-sector leadership comes at a time when some of the world's largest companies are taking ambitious positions on climate change, stepping up amid stagnating government leadership.

This places environmentalists in a difficult position. On the one hand, corporate actors are showing a much greater commitment to emissions reductions than many governments, such as the US, Canada, or Australia. Perhaps their leadership should be celebrated. But activists are wary that these developments lend credence to the dream of a self-regulating corporate ecosystem, legitimising the absence of policy. In this context, distinguishing allies from enemies becomes an exercise in speculation and second-guessing.

A moment of indulgent optimism suggests a third path forward, one that avoids this catch-22: that private-sector leadership might catalyse public-sector action by identifying new leverage points among government actors. What happens when climate-minded CEOs meet climate-skeptic lawmakers at cocktail parties in New York and London? Political elites inured to grassroots environmental activism will be most responsive to pressure coming from within their own circles. Perhaps it's better to tickle a bear than to fight one.

Stephen Lezak
2019, USA, PhD Polar Studies

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Augmenting Social Safety Nets **in Fragile States**

Caught in the throes of war, unrest and displacement for decades, Iraq remains a highly fragile state struggling to meet its social contract with the citizens. While it is recognised to be a high middle-income country endowed with oil and other valuable natural resources, the Iraqi state's capacity to service its population has been significantly bruised over the years. Intense political fragmentation along ethnic and sectarian lines, the onslaught of recurring conflicts, mass displacement in a neighborhood roiling in the flames of war, have all contributed to limiting institution building in a country that had already seen an iron-clad dictatorship for decades before it was hit by a staged invasion.

Recurring crises in Iraq have led to humanitarian emergencies that require immediate and effective response. And while there is a sizable presence of both international and national actors aiming to respond to the humanitarian needs of the country, the persistency of crises has meant that their ability to deliberate on and engage in a long-term, solutions-centric paradigm has remained limited. For example, in 2019, after years of negotiations to improve poverty alleviation measures, humanitarian and international development actors were faced with the uncertainty of policy execution as the government was forced out by people protesting entrenched corruption and abuse of power by the political elite of the country.

Yet, there is a recognised need that humanitarian aid, which is both reactive and short-term in nature, cannot be a replacement for government-led systems that cater to the basic and social development needs of the most vulnerable population of the country. International humanitarian and development actors, including UN agencies of which I am also a part, therefore have to work towards not only meeting the immediate humanitarian needs of those affected by crises, but also towards simultaneously developing the institutional capacity of the state so that sustained support can be ensured for those in need.

Along with other humanitarian actors and development actors, UNHCR has been working on enabling such a transition of humanitarian assistance to a government-led social safety net for the most vulnerable populations of Iraq. Institutional collaboration is discussed and devised at forums that have wide representation from government, humanitarian and development actors. One of the key areas of collaboration is transitioning humanitarian assistance to longer term government administered social protection schemes so that sustained support is available for those most in need.

While a highly fragile political environment has meant that policy action remains incredibly uncertain, the protracted and recurring nature of crises in Iraq has made the need for systemising such efforts both more significant and urgent.

**The views, thoughts, and opinions expressed in this article are those of the author and do not necessarily reflect the official policy or position of UNHCR or any of its partner agency.*

Safwan Aziz Khan
2016, Pakistan, MPhil Public Policy

TELLING THE TALE

BUILDING THE BEDROCKS OF SISTERHOOD: SANDILE MTETWA

Set up in 2015, Simuka-Arise Initiative is a community-based project that advocates for young Zimbabwean women's academic, economic and social empowerment. Founder and Gates Cambridge Scholar Sandile Mtetwa shares her experiences of effectively juggling her roles, among others, as a scientist and gender advocate.

Q What inspired you to set up the Simuka-Arise Initiative?

I started this initiative when I was still pursuing my bachelor's degree at the University of Zimbabwe. Talking about young motherhood or gender-based violence (GBV) are not issues that students normally want to talk about, even though it is a big problem in the country. Being a young single mother and a survivor of gender-based violence myself, I wanted to provide a platform for women like me, or women who may end up being in a similar situation in the future, to realise their strength and initiate their own journeys towards becoming empowered.

Q How widespread is the problem of GBV back in Zimbabwe?

In Zimbabwe, our culture of patriarchy is at the heart of the problem. This situation has worsened during the recent economic crisis in the country. Financial exploitation has led to increased cases of child marriage and sexual exploitation. We have met a lot of girls getting married off quite early because of poverty. A lot of women are also compelled to stay in abusive marriages because they are not financially independent. Men are also victims of GBV, and I think more platforms centred on men by men should be created.

Q Given this context, how do you engage with the idea of "empowerment" through the initiative?

We believe that it is important to have a holistic, 360-degree view to understanding empowerment that collectively focuses on the social, economic and academic components. For, there are women who are economically independent, and yet, abused. Or girls who are well-educated, but still standing at the receiving end of violence. Thus, the social component becomes very critical. Through our work, we intend to solidify our influence in raising awareness and building youth advocates against gender-based violence, provide life skills-based education to girls and young women, and showcase inspiring females in Zimbabwe.

Follow Simuka-Arise Initiative on Facebook:
https://www.facebook.com/SimukaInitiative/

Q How do you manage your time between your PhD research and social advocacy?

As a chemist, I am required in the lab, every day, from 9am to 5pm. Sometimes, later or earlier. Early on, I came to accept the fact that the initiative was going to be a more long-term commitment than the PhD experience. My team includes other student-volunteers, who also do multiple jobs on the side to earn a living. So, every year, we try and set up only a certain number of projects, but make sure to do it well. In the university years, I believe, it would be ideal to lay the foundation of the initiative without extending oneself too thin.

Sandile Mtetwa
2018, Zimbabwe, PhD Chemistry

T-S Ar.38.64 provided by the Syndics of the Cambridge University Library

RECOVERING THE QUR'AN IN AN EGYPTIAN SYNAGOGUE

Early in 1897, Solomon Schechter, a Romanian-born Cambridge lecturer, stood on the second floor of a synagogue in Cairo, knee-deep in hundreds of thousands of damp scraps of paper. He was sifting through the musty heaps for ancient Bible manuscripts, but he quickly recognised their greater importance: they represented the entire history of Egyptian Jewish life, stretching back more than a millennium.

Schechter was inside the Ben Ezra Synagogue's *genizah* chamber, a secure place used by Jews to store documents written in Hebrew letters. These papers – especially those with the name of God on them – were sacred and could not be discarded like typical rubbish. As a result, the Ben Ezra *genizah* contained all manner of Hebrew-script texts, from government petitions and tax receipts to personal letters, poems, prescriptions, cookbooks, and calendars. With permission from Cairo's chief rabbi, Schechter shipped 190,000 of these fragments to the Cambridge University Library.

Scholars of the 'Cairo Genizah' have spent 120 years sorting, conserving, and studying this material, and it has proven more informative about medieval daily life than any other source. However, Genizah research is also a field of neglect. For every text that yields historic breakthroughs, dozens more sit unread in dark corners of library stacks.

Some of the most neglected material reveals a paradox of the Genizah: besides the expected Hebrew-script texts, Schechter also found 7,000 fragments in *Arabic* script. Arabic was the native language of Cairene Jews, and these manuscripts are just as varied as the rest of the Genizah. Remarkably, they even include fragments of the Qur'an, the holy book of Islam.

In 2018, I began studying these Qur'ans with a researcher at Cambridge's Genizah Research Unit. We identified 23 separate manuscripts, spanning the period from 950 to 1897. Many of them were written by regular people, rather than trained scribes, which makes them important evidence for the history of Qur'anic transmission.

They also raise puzzling questions. Why did Cairene Jews own pages of the Qur'an? Why did they store them in their synagogue? One curious pattern may offer an explanation. Most of the fragments contain Qur'anic passages that feature biblical characters or describe the treatment of non-Muslim groups. Both topics might have interested the Egyptian Jewish community, either for insights into Islam's relationship with Judaism, or for guiding their interactions with the local Muslim government. Still, this pattern may only be a coincidence – after all, there are many biblical figures throughout the Qur'an.

Either way, it seems that some medieval Jews owned and read pages of the Qur'an in Arabic script, and we are only now beginning to understand their place in Middle Eastern history.

Nicholas Posegay
2017, USA, PhD Asian and Middle Eastern Studies

LIGHTING UP CAMBRIDGE with Gospel Music

Growing up in Nigeria, I sang in church and school choirs and danced in cultural dance groups. Like most of Africa, music is a big part of our culture, and also a form of communication. It is used for storytelling, at weddings, after childbirth, at child-naming and coming-of-age ceremonies, political campaigns, and much more.

When I arrived in Cambridge in October 2015 to begin my PhD journey, I knew there was a little piece missing in this prestigious university. It was a gospel choir. Although Cambridge colleges have choirs that sing amazing songs at evensongs and other occasions, I wanted something different – a vibrant, uplifting, fun, soulful and culturally diverse kind of music that would allow me to freely express myself and my Christian faith, whilst encouraging others.

A year later, I started the Cambridge University Gospel Choir with about a dozen students and friends, all of whom were of Afro-Caribbean heritage. This was not unusual considering that gospel music is deeply rooted in the rich tradition of the African American church. However, my desire was to see a more diverse group of people, from all nations and tongues, coming together to sing, praise God, and have a wonderful time of fellowship with one another.

In less than a year, the choir grew rapidly, and became even more diverse. Today, we have 70 members representing almost every continent. Our members are mostly undergraduate and postgraduate students, as well as, university staff and people from the community.

We organise termly concerts and gospel music events, which attracts hundreds of people from Cambridge and other cities including London. We have also performed in the finals of national gospel music competitions including the televised 2019 BBC One Songs of Praise Gospel Choir of the Year. It's always a time of joy and fun. Beyond the fun, however, is the strength we find in weakness; hope in adversity, and inspiration to achieve a greater purpose. I am so glad that the gospel choir has become a home away from home for many students and members, and indeed, one big family for all of us. It is everything that I never imagined but the very things that I hoped for, especially as it gave me the opportunity to do what I love – music in addition to science.

Carol Nkechi Ibe
2015, USA, PhD Plant Sciences

PHOTO ESSAY · THE SCHOLAR MAGAZINE ·

SPEAKING TO **THE STARS**

Rodrigo Córdova Rosado presents snapshots from the American Southwest, of walking through the incredible archaeoastronomical structures left behind by the Chacoans from the 9th to the 12th centuries CE. Armed with a GPS locator, compass and camera, he tells us a story of the relationships between humans, stars and the skies, in the worlds that came before us.

Chacoan Potsherds:
As I pass through the Chacoan Great House named Peñasco Blanco, I stumble upon an array of potsherds, and cannot help but remember how modern analyses have shown the vast majority show traces of cacao. This was one among other pieces of evidence, such as macaw feather ornamentation and copper bells, that showed there was significant trade relations between Chaco Canyon and the Mexican Highlands, where these resources were available. What else may they have shared?

Overlooking Pueblo Bonito:
Standing above the canyon mesa, overlooking the structures people lived in and expanded over centuries, I could hardly conceive the scale of the world I was walking around. Why build across such a varied and difficult landscape? Why create particular shapes and orientations to the buildings?

Square House at Mesa Verde:
After leaving Chaco Canyon just as a snowstorm rolled in, we headed up to the state of Colorado, and spent a day visiting Mesa Verde National Park, where incredible cliff dwellings like this one dazzle visitors, and provoke our curiosity of the people who lived and were later forcibly removed from this breathtaking landscape. The Square House, as it's named, is the four-story adobe tower seen in the image.

Cliff Palace:
The largest site at Mesa Verde, Cliff Palace is a massive structure built between the 10th and 13th centuries C.E. It housed another group of ancestral Puebloans, of the same ethno-linguistic group that lived in Chaco Canyon in the centuries during and prior. However, this place was not only inhabited longer, but also led to the spread of more dwellings across the American southwest reproducing the Mesa Verde style. It also invites us to ponder why they built such structures underneath a cliff, adding difficulty to traverse the landscape and arrive at the dwellings.

Rodrigo Córdova-Rosado
2019, USA, MPhil Archaeology

Supernova Petroglyph:
In 1054 C.E., Chinese and Arabic astronomers noted a supernova in what we would come to know as the Crab Nebula, appearing just below the crescent moon for a period of days so bright it was as distinct as the moon itself. Could the Ancestral Puebloans have seen it themselves? Per the relative position and size of the crescent moon to the star, it is remarkably close to how the 1054 C.E. supernova would have appeared in the sky.

"Nothing but Science and Its Academic Delights"

Maladies of the brain have been diagnosed well before doctors possessed the technology to image the brain. An example of how this was done reveals just how cunning the early 20th century neurologists were, to be able to detect abnormalities of an organ invisible to them.

Let's consider the diagnosis of a brain tumour. Neurologists made this diagnosis by examining the eye. A portion of the eye swells as a result of increased pressure within the brain, which could be the result of something accumulating within the skull. This "something" could be blood, and if the patient had recently suffered a head injury, a diagnosis of a subdural hematoma could be made. Alternatively, if the patient was complaining of headaches and hallucinations, as Frigyes Karinthy was, the man may have a brain tumour.

It is under this backdrop that Karinthy, a Hungarian poet and playwright born in 1887, describes the scene of his diagnosis of a brain tumour in his memoir *A Journey Round My Skull*. While brain tumours are now recognised as a not uncommon affliction, before brain imaging was invented, it was rare for a doctor to assemble enough evidence to identify the condition while the patient was still alive. A clever diagnosis like this could establish a physician's reputation, the way a lawyer may build his career off a high-profile prosecution. Accordingly, after Karinthy's doctor looked into his eye and found swelling of the optical disks, the diagnosis was followed by a celebration of sorts. In Karinthy's words: "[The doctor] was as pleasantly excited as an entomologist who has stumbled on some coveted specimen. For the one as for the other, the world held nothing but science and its academic delights." Of course, all of this celebration feels quite ironic, as this diagnosis, in addition to being an exciting discovery, doubles as a potential harbinger of death for a young man.

Karinthy's story ends well – he is handed over to an esteemed neurosurgeon who skilfully removes the tumour. But the irony he witnessed during the diagnosis is one that is confronted by a number of researchers who work with clinical populations. On the one hand, we are excited to see unusual cases, as a close study of these cases may contribute to a better understanding of the disease in question, leading to better care for future patients. On the other hand, one must not forget the current patients, and one must empathise with the unusual hardship that they will have to endure.

To be excited about a tragic event is a paradox worth wrestling with, but not one to feel guilty about. Few people, I think, work on important problems solely with utilitarian intentions. We work on certain problems not just because they are important but also because they are interesting, activating the same parts of the mind that revel in a Sudoku puzzle. Nothing is inherently wrong with being fascinated by your field of study. In fact, an investigator with two-pronged motivation to solve an important problem is in an ideal position to make an impact. However, we cannot fool ourselves into thinking we inhabit a world composed solely of academic delights. If our research involves people, they must not be forgotten.

Ayan Mandal
2018, USA, PhD Psychiatry

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Water Quality Monitoring by Citizen Science

Clean freshwater is fundamental to societies. However, globally, one in three people do not have access to it – a situation which demands more comprehensive and affordable monitoring frameworks. Gates Cambridge Scholars Andre Holzer and Maximilian Stammnitz have built **PuntSeq**, a citizen-science project, to address this challenge.

Safe freshwater is a human right which has become increasingly difficult to assure, particularly in the prospect of climate change and rising urbanisation. In the UK, for example, very few rivers are considered safe for bathing. Major issues lie in the lack of regulatory compliance, Environment Agency funding and the opaque nature of water testing. We would hence greatly benefit from a comprehensive, handy and easily deployable framework to monitor freshwater reservoirs including lakes and rivers.

Microbial testing is key for controlling risks of infection by waterborne diseases. Traditional assessments are based on the detection of specific bacterial pathogens, by growing them on selective media in a diagnostic laboratory. This cultivation process is often time-consuming and infrastructure dependent. We think that metagenomics, the study of genetic material from environmental samples, poses a modern alternative. The idea: traces of DNA, the blueprint of life, can be used to track the presence of any biological organism.

In 2017, our citizen science project PuntSeq (www.puntseq.co.uk) was founded to rethink freshwater testing. Since then, we implemented a new protocol centred around the world's smallest DNA sequencer MinION (see photograph) and performed a comprehensive case study on the local River Cam.

Released in February 2020, our openly accessible preprint* (Urban & Holzer et al., 2020, bioRxiv) describes the design of all essential experimental steps and an evaluation of computational DNA analysis methods. Using this framework, we were able to depict the main microbes in the River Cam, and also tracked spatial changes in bacterial composition, e.g. due to the influx of wastewater. In addition to common freshwater bugs, this platform allowed us to distinguish closely related pathogenic and non-pathogenic species such as the bacteria causing water-transmissible leptospirosis (Weil's disease).

Overall, our £4,000 study served to inform Cambridge's citizens about potentially dangerous locations, times and types of pathogens living in the River Cam. This can now be used to guide local public discussion and political action. We envision that our initiative will stimulate future environmental monitoring initiatives, and that it benefits public health organisations around the world by adapting inexpensive, portable technologies.

Andre Holzer
2017, Germany, PhD in Plant Sciences

Maximilian Stammnitz
2016, Germany, PhD in Cancer Genetics

* Urban & Holzer et al., 2020, bioRxiv

© PUNTSEQ

Orbis Terrarum: The Global Imaginary from Antiquity to Earthrise

"The desire to map is never innocent." (Jaś Elsner, Voyages and Visions 1999)

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On Christmas Eve 1968, while in lunar orbit aboard Apollo 8, Bill Anders took a photograph that revolutionised mankind's conception of our world. *Earthrise* captured the blue planet cresting the horizon as the orbiter rounded the dark side of the moon. For the first time in human history, we could see with our own eyes, what cosmographers, geographers, cartographers, and philosophers had worked for millennia to discern. Since then, the picture has only become clearer with advances in technology. We can even track the ways in which the surface of the earth changes in real-time. A shocking testament to this is the archive of images of the former Aral Sea captured from space between 1985 and 2009, which track its disappearance due to the diversion of its tributaries by Soviet irrigation projects. Cartography seems now to be a more dynamic and prescient discipline than ever.

However, interest in mapping thrived long before man could envision the prospect of leaving the earth and surveying it from space. The earliest known visual representations of the world date back at least as far as the sixth century BC (eg, the Babylonian *Imago Mundi*, and the reconstructed world maps of Anaximander and Hecataeus of Miletus). These reflect a conception of the globe built on knowledge retrieved from land and sea expeditions. One of the greatest difficulties faced by these early mapmakers was organisation: without having seen the earth from a separate vantage point, how were they to know where to locate the places they had discovered relative to one another? While some opted for purely physical models, others felt that the shape of the world was better abstracted along metaphysical lines.

A particularly good example of this appeared several centuries after Anaximander and Hecataeus but still long prior to the advent of space exploration: the *Ebstorf Mappa Mundi* of Gervase of Ebstorf (13th century). The map is clearly oriented around a thoroughly Christian interpretation of cosmography. It locates Jerusalem at the centre of the world and depicts the head, hands, and feet of Jesus protruding from each side of the globe. What we have, then, is a cartographic realisation of a theological metaphor: the world as the body of Christ.

Documents like this should at least give us pause to reflect on the cultural significance of modern cartography: has the long march of scientific progress really allowed us to transcend the ideological concerns of our forebears, or is *Google Earth* just as conditioned by the anxieties of modernity as the *Ebstorf Map* was by Medieval Christianity?

Daniel Hanigan
2019, Australia, PhD Classics

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Sydney, Australia – March 15, 2019 – 20,000 Australian students gather in climate change protest rally, School Strike 4 Climate, and demand urgent action on climate change.

"We need to wake up. We need to rise up. We need to open our eyes and do it now, now, now"

Kim van Daalen advocates for the need to reframe climate action, to move from an abstract, future problem to a people-centred, personal issue.

It's 2017, and I'm standing in front of thousands of people in Amsterdam demanding radical climate action, as the Peoples' March marked the 100th day of Trump's presidency. It is my first experience of speaking "*truth to power*". I see optimism and energy in the eyes of the people in front of me. "*It is not too late*," they say. It was at this moment that I realised that changing societal norms takes people, people critiquing the legitimacy of institutions and ideologies, people challenging political discourse and vested interests.

Social movements have historically been major forces for political reform, but rarely has society managed to mass-mobilise people in the ways we are currently witnessing. Climate change science is unequivocal, and people are hungry for change. Yet, political rhetoric is coloured by bigotry, ignorance, isolationism and polarisation. Policy responses are slow and climate change loses ground to other issues. Attitudes towards climate change often reflect inherent ideological positions.

In public health, we argue for a collaborative approach that integrates *health in all policies* to improve wellbeing. Could we also bring the environment into all policies in recognition of the interactions between environmental and non-environmental issues? Climate change is a multiplier of insecurity, conflicts, vulnerabilities, food system challenges, economic risks and poor health. On the positive side, it can create new jobs and safeguard national stability and energy-supply security, while "non-environmental" policies can also benefit the environment.

What if, instead of speaking about environmental policies, we spoke of health policies or policies stimulating economic growth? For instance, more than seven million deaths every year are due to air pollution. Climate change also has consequences for allergies, asthma and cardiovascular disease. Clean air and healthy diets have a positive health benefit. Environment and health are intimately connected. It is not either/or. Notably, while environmental legislation to reduce greenhouse gas emissions has stalled in the US Congress, the Environment Protection Agency (EPA) was able to regulate several gases under the Clean Air Act – based on a public health argument.

But it's not just about health. We can reframe environmental issues using an economic opportunity frame, a justice frame or a gender equality frame. Reframing allows climate action to move from an abstract, future problem to a *people-centred*, personal issue, offering a way to engage deniers and sceptics to act pro-environmentally.

Climate change tends to be reported as all *doom and gloom*, yet, fear-based scenarios can make it difficult to motivate people to act. Presenting climate action as being about opportunity decreases our psychological distance, and incentivises action. The path to success is not straightforward. Yet, climate change should not have to provoke division.

Society has changed. It's time for politics to catch up.

Kim Van Daalen
2018, Netherlands, PhD Public Health and Primary Care

"WE ARE NOT EXTINCT"

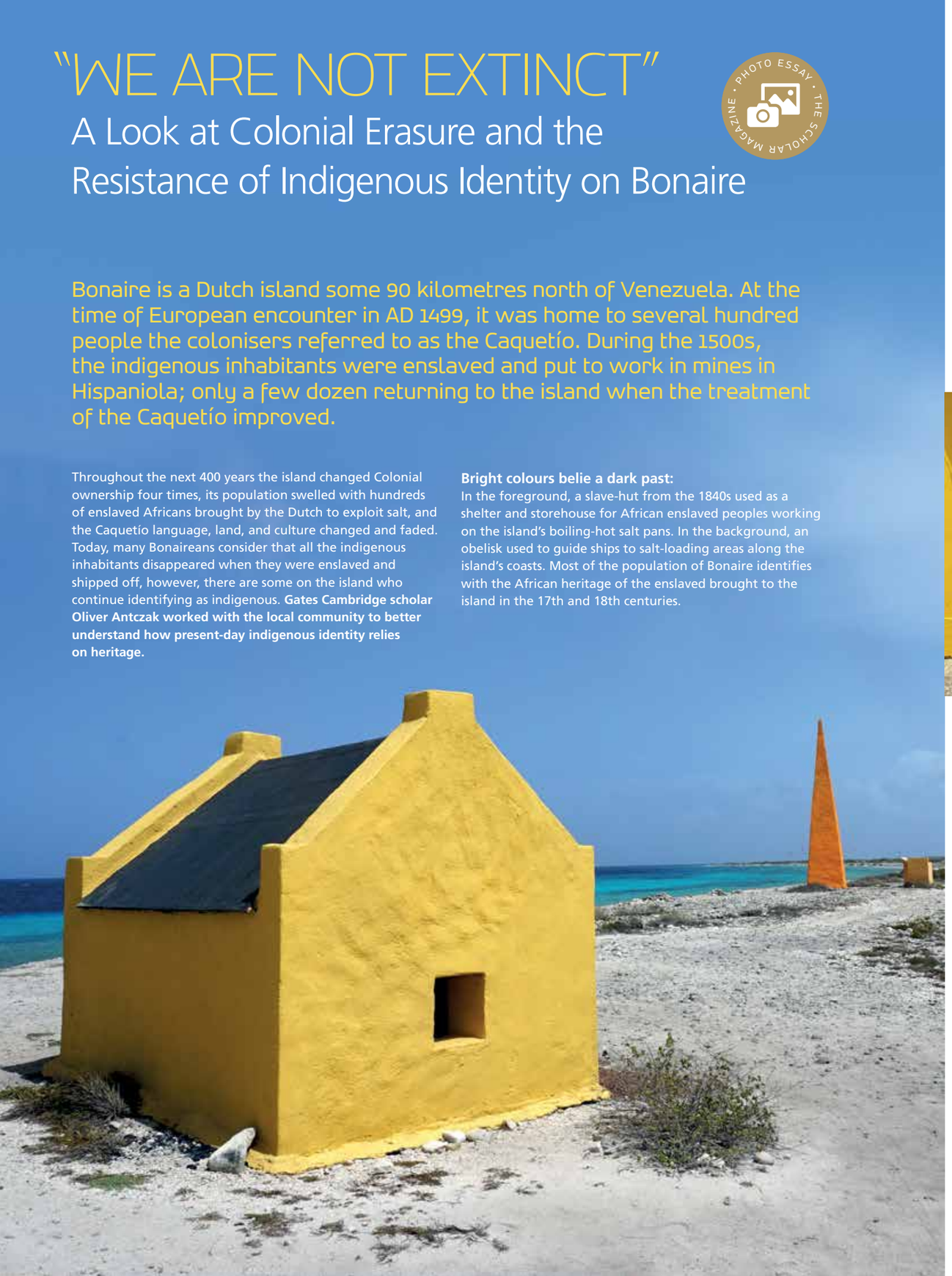
A Look at Colonial Erasure and the Resistance of Indigenous Identity on Bonaire

PHOTO ESSAY · THE SCHOLAR MAGAZINE

Bonaire is a Dutch island some 90 kilometres north of Venezuela. At the time of European encounter in AD 1499, it was home to several hundred people the colonisers referred to as the Caquetío. During the 1500s, the indigenous inhabitants were enslaved and put to work in mines in Hispaniola; only a few dozen returning to the island when the treatment of the Caquetío improved.

Throughout the next 400 years the island changed Colonial ownership four times, its population swelled with hundreds of enslaved Africans brought by the Dutch to exploit salt, and the Caquetío language, land, and culture changed and faded. Today, many Bonaireans consider that all the indigenous inhabitants disappeared when they were enslaved and shipped off, however, there are some on the island who continue identifying as indigenous. **Gates Cambridge scholar Oliver Antczak worked with the local community to better understand how present-day indigenous identity relies on heritage.**

Bright colours belie a dark past:
In the foreground, a slave-hut from the 1840s used as a shelter and storehouse for African enslaved peoples working on the island's boiling-hot salt pans. In the background, an obelisk used to guide ships to salt-loading areas along the island's coasts. Most of the population of Bonaire identifies with the African heritage of the enslaved brought to the island in the 17th and 18th centuries.



Links to the past:
For those maintaining an indigenous identity, physical appearance, specifically long strong black hair, is the most recognised indicator of indigeneity. This portrait was presented to me by a local because it showed off her hair, "*indjan*". As other identifying features were changed or lost through the colonial period, physical appearance remained easy to spot. Closeness to nature, a love of navigation, local healers (curanderos) and a brash temper, are the other characteristic features claimed today.

© CAMILA CRESTIAN-THOMAS

Trajectories of Distinction:
Up until 40 years ago, neighbourhoods on the islands strictly protected their borders; inter-community marriages weren't permitted either, so racial and cultural differences were maintained. The ceramic plaque on this house depicts a Native American from the Great Plain wearing a war bonnet. This re-purposed symbol represents an indigenous household in the neighbourhood of Nord Saliña, where indigenous features are more commonly seen than in other neighbourhoods.

Rethinking the Museum:
One of the greatest challenges of archaeology is meaningfully connecting with present-day communities without imposing the categories of the colonists to define and interpret the pre-colonial. I reworked the above unlabelled archaeological exhibit that spoke of a distant unknowable past into a chronological display that demonstrates a continuity of indigenous existence.

Planting the seed:
Together with the Cultural Ministry on the island, I co-organised a "Quiz Kultural" for children from five Bonairean schools. We designed the questions to promote knowledge of pre-colonial indigenous groups, highlighting the continuity of indigenous existence and influence on the island.

Oliver Antczak
2019, Poland/Venezuela, PhD Archaeology

THE TWO FACES OF EARLY CANCER DETECTION

Cancer diagnostics is entering a fast-evolving era of clinical genomics, where we can tell if someone has cancer based on their genetic information. This technology promises to positively transform people's lives as the early diagnosis of cancer can significantly increase patients' survival.

Arguably, we can claim that we cure cancer through early detection. As exciting as this sounds, there are a plethora of complications associated with early detection.

The advent of DNA sequencing technologies has made it possible to identify genetic alterations present in cancer cells to a prodigious level of detail. This allows researchers and clinicians to identify previously unknown cancer-related biological markers. For example, a combination of one such biomarkers with a novel, minimally invasive sample collection device, called Cytosponge, promises early identification of patients at risk of developing cancer of the oesophagus. The Cytosponge device is comprised of a sponge compressed within a gelatine capsule, which is further attached to a long string. Once the patient swallows this capsule and it reaches the top of the stomach, it opens up and the sponge unfurls. Next, the Cytosponge is retrieved by pulling the attached string, which collects cells from the oesophagus along the way up.

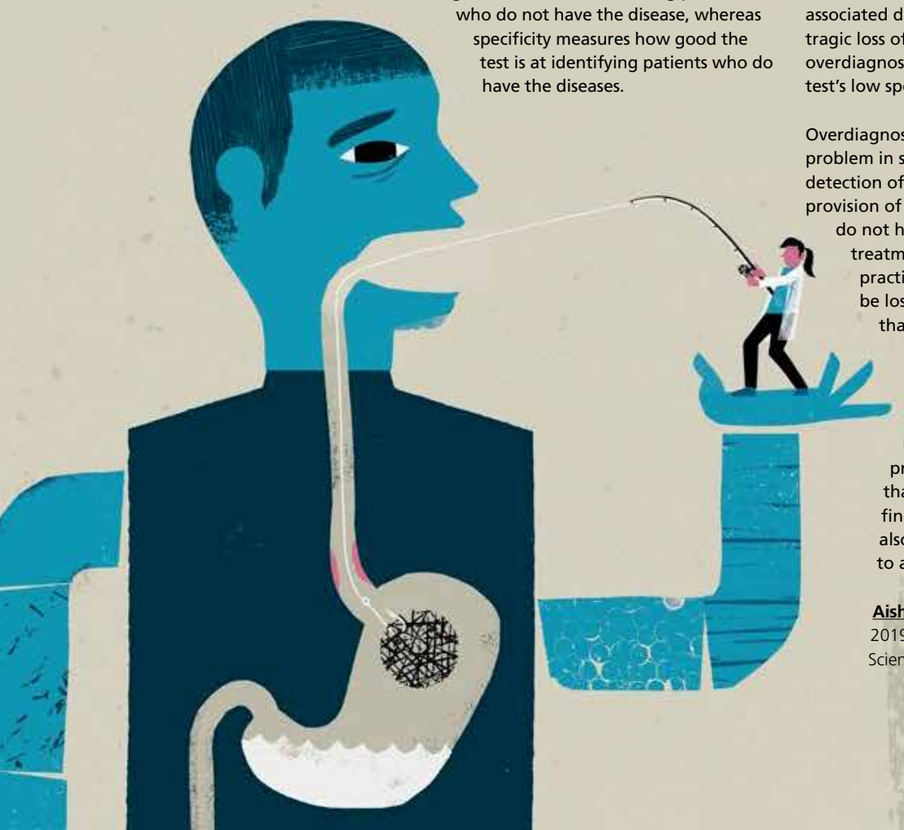
Any novel clinical biomarker must fulfil rigorous sensitivity and specificity criteria to be widely adopted. Working in the group which developed the Cytosponge device, this is indeed the primary challenge my PhD project tries to tackle. The sensitivity tells us how good the test is at detecting patients who do not have the disease, whereas specificity measures how good the test is at identifying patients who do have the diseases.

A striking challenge in early cancer detection is finding that one-in-a-billion, cancer-specific genetic alteration in the small tissue biopsy collected from individuals. Spotting this genetic alteration is akin to finding a needle in a haystack, perhaps not impossible to achieve, nevertheless a formidable challenge. With this dilemma, it is rather easy to fall into the trap of paying more attention to the sensitivity of a potential screening test over its specificity. The Japanese neuroblastoma screening programme is a case in point.

In the early '80s, the Japanese ministry of health began testing the urine of asymptomatic infants for hormone-like chemicals thought to be secreted by neuroblastomas, one of the most common childhood cancers. The screen diagnosed neuroblastoma in more children than expected and were then swiftly treated in an effort to eliminate the cancer early. The screening was later halted after studies showed that it did not reduce neuroblastoma associated death. Conversely, it led to tragic loss of many infants' lives due to overdiagnosis, a consequence of the test's low specificity.

Overdiagnosis remains a central problem in screening and early detection of cancer as it can lead to provision of treatment to patients who do not have the disease. Since any treatment carries some risks, in practical terms some lives can be lost. These examples show that when we place emphasis solely on finding the needle in a haystack, we can lose sight of the fact that there might actually be all sorts of "needles" present. It is crucial to ensure that "the needle" that we find is not only relevant, but also specific for what we want to achieve.

Aisha Yusuf
2019, Nigeria, PhD Medical Science at the MRC Cancer Unit



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TELLING THE TALE

Rethinking the Americas

Q&A

Gates Cambridge scholar Theo Di Castri traces his experiences of co-founding *Catalyst*, a cross-border educational initiative that build new networks of exchange, analysis, solidarity and action between communities on the front lines of some of the most pressing problems in the Americas.

Q Why is it most critical to "rethink" the Americas at this point in time?

Networks of organised crime and draconian counternarcotic policies are contributing to waves of violence, mass incarceration and overdose deaths across the continent. Spanning nine different nations, the Amazon forest and those indigenous to it are under threat on all fronts by the incursions of domestic farmers and miners, transnational capital, national militaries and evangelical missionaries. In Venezuela, Central America and Mexico, complex regional geopolitics are fuelling unprecedented migration into neighbouring countries and growing humanitarian crises. Spaces to reckon with the full, transnational complexity of such issues, however, are few and far between. Those that exist are often inaccessible to the communities living on the frontlines of these conflicts.

Q What were your motivations behind setting up Catalyst?

Catalyst grew out of a series of conversations between a group of friends from across the Americas. Growing up in Canada during the '90s, I received a prohibitionist "just-say-no" drug education. It wasn't until I began exploring the history and politics of drug policy during my post-secondary studies that I started to understand how drastic and unevenly distributed the social costs of prohibitionist drug policies actually are. Living in New York and Mexico City over the past decade further exposed me to the transnational complexity of the War on Drugs. Looking back on the drug education we had received as teenagers, we shared a common frustration about the lack of information and space we had been given to grapple with the full complexity of issues. To redress this situation, in 2017 we co-founded Catalyst to steer social change with a transnational, transgenerational and transdisciplinary approach. Through targeted outreach to communities on the frontlines of our focus issues, we invite high school aged youth and educators from across the Americas to participate in our programs.

Q What issues have you been attempting to address?

Our inaugural programme has focused on the War on Drugs and brings together students and educators from along the entire transcontinental drug supply chain. Gates scholar and Catalyst team member, Emiliano Cabrera Rocha is currently developing a programme around climate justice in the Amazon that will bring together participants from across the Amazonian region. We have plans to develop other programs around migration, food security, labour and gender justice.

Theo Di Castri
2019, Canada, PhD History and Philosophy of Science

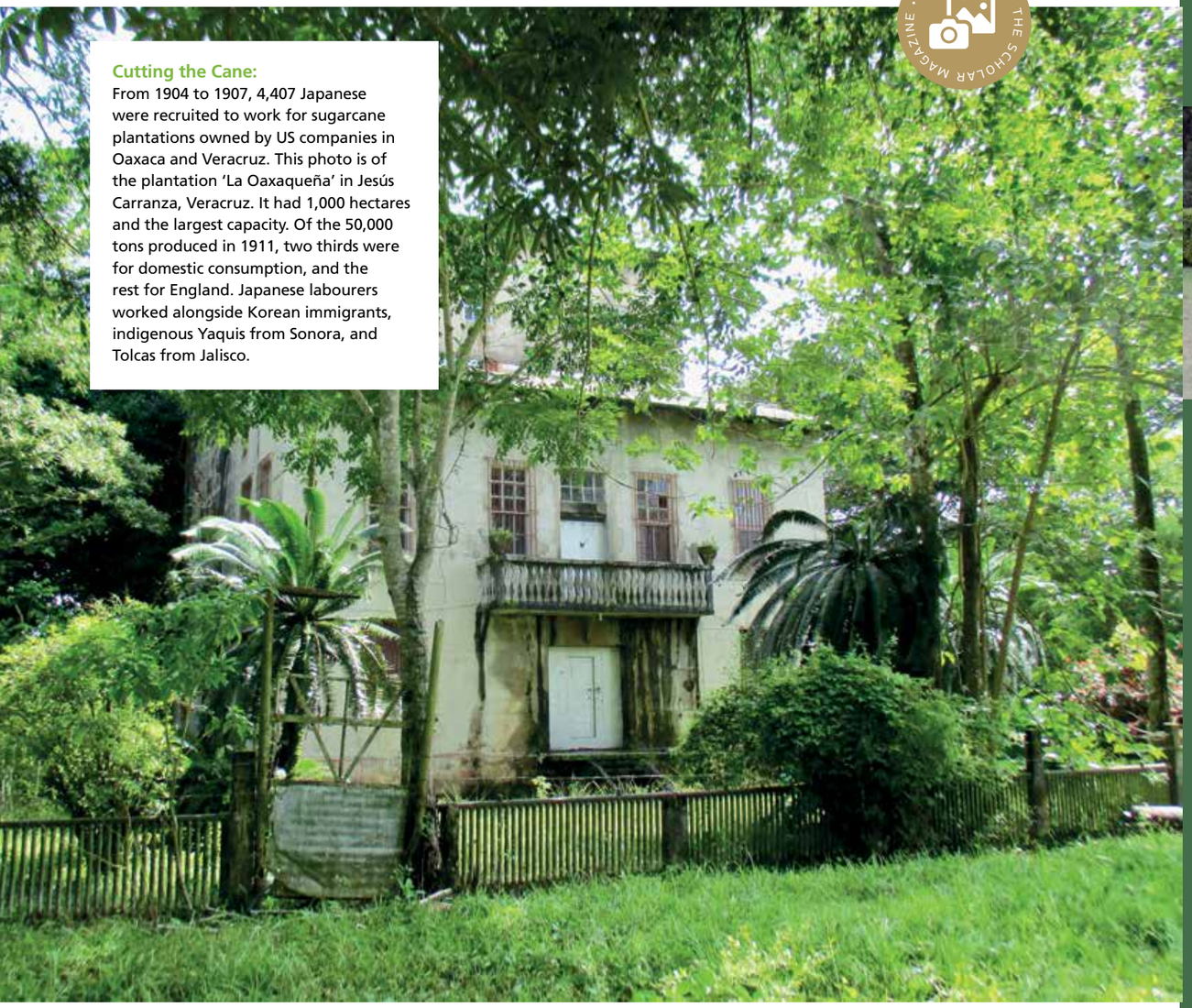
Follow Catalyst on
https://www.catalyst-catalizador.org/

STRANGERS IN THEIR OWN LANDS:

Living as Ethnic Minority Japanese in Mexico

Latin American scholar and lawyer, **Jessica Fernández de Lara Harada** travels to the main cities of settlement for Japanese migrants and their descendants in Mexico to unearth their long and buried histories, and everyday encounters with racism.

PHOTO ESSAY · THE SCHOLAR MAGAZINE



Cutting the Cane:
From 1904 to 1907, 4,407 Japanese were recruited to work for sugarcane plantations owned by US companies in Oaxaca and Veracruz. This photo is of the plantation 'La Oaxaqueña' in Jesús Carranza, Veracruz. It had 1,000 hectares and the largest capacity. Of the 50,000 tons produced in 1911, two thirds were for domestic consumption, and the rest for England. Japanese labourers worked alongside Korean immigrants, indigenous Yaquis from Sonora, and Tolcas from Jalisco.

Setting Foot:
In 1897, six free and 28 contract labourers arrived in Chiapas to work in the Enomoto colony. From 1901 to 1907, the largest number of Japanese contract labour immigrants arrived, totaling 9,607. Coming from Japan's rural southwestern villages, they sought to make a living here to, in turn, improve the lives of their families back in Japan. However, social upheavals impeded their return. This is the tomb of one the free migrants who died during the Mexican Revolution.

The Quest for Truth:
The national ideology of mestizaje claims to put an end to the "war of races" by eliminating all that is not white and Spanish. It is a racial project that some scholars have referred to as genocide. It has been mostly successful in erasing the history of racialised ethnic minorities, but some traces of it are still present in our bodies, names and memories, reminding us of our permanent search for truth and justice. This photo is of 'Himawari', a dear group of elderly Japanese Mexican women, who I was honored to join during my field work.

On Tenterhooks:
From 1906 to 1907, 1,400 Japanese built railroads in Colima, and 300 of them worked in the mine 'Montaña Negra' in Sonora. From 1901 to 1907, 3,000 Japanese worked in the mines 'Las Esperanzas' in Coahuila. In 1904, 500 Japanese were recruited in the coal mine 'El Boreo' in Baja California. This photo is of a "tienda de raya" (company's store) were Japanese workers bought staple goods from their owners. Carbide lamps used by Japanese mine workers hang on the window.

Healing Old Wounds:
In May 1942, Mexico declared war on Japan, froze the assets of all Japanese, ordered them to abandon their homes, and concentrated them in Mexico City, Guadalajara and Temixco. Uprooted and deprived, many Japanese were arrested and detained without reason. The Mutual Help Society was their main source of aid. This photo is of the Nikkei Convention in Hacienda de Temixco, Morelos, used as a concentration camp for 500 Japanese Mexican families during WW2.

Jessica A. Fernández de Lara Harada
2016, Mexico, PhD Latin American Studies

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Combating the Jargon in Immunology

As researchers aim to make their scholarship more accessible and transparent to the public, Gates Cambridge scholar **Jacqueline Siu** warns us that the key challenge lies in combating the jargon, especially immunology's complex naming system.

From the measles vaccination that saved an estimated 17.1 million lives in the past two decades, to organ transplants and novel therapies for cancer, immunology has changed the face of modern medicine. These scientific breakthroughs were made possible because of investments from governments globally – millions of public monies entrusted to experts to improve human health. By following a set of methods that rigorously test hypotheses, researchers can systematically justify why new treatments are beneficial to our society. But beyond the lab, do researchers also have the responsibility of ensuring their findings are accurately communicated to the public?

Due to faulty initial assessment of COVID-19, the British government chose to rely on "herd immunity" and nudge theory to change public hygiene habits while other countries were locking down.

In recent years, experts' voices are seemingly muffled by the cacophony of pseudoscientific myths perceived to be "science". As Sir Karl Popper notes, "pseudoscience seeks confirmations while science seeks falsifications." Yet, pseudoscience can be extremely attractive and convincing to the unsuspecting public. Losing public trust towards scientific discoveries can be detrimental and long-lasting. For instance, vaccine rates have fallen to decade lows, even as cases of previously eradicated diseases like measles are increasing. All the research and effort that goes into creating better therapies are for nought if the public does not use them.

Today, public outreach events and open access to key research articles are becoming commonplace, but nonexperts' understanding of immunology is hampered by the jargon of the field. With a seemingly random naming system, immunology is fraught with confusing terminology. This is further dangerous when jargons get hijacked without proper explanation. For instance, "herd immunity" was used as a potential coping strategy during the early stages of the British COVID-19 crisis. Herd immunity is an extremely effective strategy where the vulnerable who cannot be vaccinated are protected from disease by the majority who are vaccinated. Unfortunately, unlike in the context of vaccination which would safely allow the population to become immune, the strategy proposed by the UK government would have been better termed as "survival of the fittest". Due to faulty initial assessment of COVID-19, the British government chose to rely on "herd immunity" and nudge theory to change public hygiene habits while other countries were locking down. This heavily criticised oversight was later corrected, and the UK also began its lockdown. However, the consequences of the "herd immunity" term being misused have yet to be felt, as it may be best remembered in the future as the failed UK strategy to handle COVID-19 rather than its ability to save millions during a successful vaccine campaign.

As researchers aim to make their research more accessible and transparent to the public, a key challenge is combating the jargon, especially immunology's complex naming system. Immunologists need to start using concise and clearer language because the current use of heavy jargon may be contributing to the festering of untrue and damaging pseudoscience.

Jacqueline Siu
2016, Canada, PhD Surgery

WANT TO BUILD INTELLIGENT MACHINES? **MIND THE BRAIN!**

In the past decades, we have seen astonishing progress in the world of computers. Not only did they start beating us in our most complicated games we once thought lie at the peak of human cognition (eg, Chess and Go), we also set computers free as self-driving cars on the road, and in clinics to aid medical diagnosis.

However, while they excel in specialised situations, they lack the ability to abstract and generalise to unseen situations. In contrast, human brains are all-round talents. They can do a broad variety of complicated tasks, learning quickly from little data, and apply this knowledge in entirely new settings – all using very little energy. So, by taking a detailed look at the human brain, researchers including myself, are trying to find out how we can make real progress towards building more intelligent, task-general machines. From the molecular to the societal, there are various levels on which one could compare humans to machines in terms of how information is computed to solve problems. I will introduce you to two: the cognitive and the neuronal.

On a cognitive level, we would like to understand the overall strategy applied to solve complex problems. One cognitive difference which could explain why we humans outperform machines in novel problem environments, is that we can solve problems in a compositional way. We can look at a problem, structure it into simple sub-problems to solve those and put the solutions back together to respond to the big problem. We do this all the time, when booking a holiday or understanding a complex math equation. It is something that patients with damage to brain regions needed for higher cognition really struggle with – and machines do too.

On a neuronal level, we would like to know how this strategy is implemented in the brain's circuitry – how can all this work using only single neurons which are not able to grasp the whole problem by themselves? Decades of cognitive research helped us understand the strategies humans use relatively well, but we don't really know how the circuit level implementation could work. For this, we record high-resolution brain data and compare those to computational models to understand which mechanism could lie behind those complex strategies.

The development of intelligent systems is very likely to be an open-ended process and not a one-time goal we can achieve. Taking some inspiration from the 1.5 kg salty meatball we all carry around with us, might be a good place to set forth on this journey.

Jascha Achterberg
2019, Germany, PhD Medical Science at the MRC Cognition and Brain Sciences Unit

© MRC COGNITION AND BRAIN SCIENCES UNIT, UNIVERSITY OF CAMBRIDGE

Q&A

TELLING THE TALE

SPEAK UP. SPEAK OUT.

© RODRIGO CORDOVA ROSADO

Armed with the resolve to end everyday racism in the university, and to build a strong student support group, music scholar **Collin Edouard** set up the #SpeakOut campaign on Facebook early this year. Ever since, the voices have multiplied, and every story matters.

Q What are the ways in which racism and discrimination find place in educational spaces?

It was at my first elementary school in California, a private school that my mother was keen for me to go to so I could get a good education, that, as the only black student, I had my first experience of intense racism. I was called every single name associated with my skin colour. It happened every day. I quickly understood that people use fear to bully other people and that it was their problem not mine. It gave me very important foundations for being strong in the face of adversity. More recently, when I came to Cambridge to begin my degree in music, I was quite shocked to see that even after all these years, I was the only black student in my cohort. It became important for me to not merely navigate through the system, but also to expand it.

Q What sparked the need to create #SpeakOut?

In February this year, I was assaulted by a college porter as I entered the building for a scheduled appointment. I was really upset and wasn't going to say anything. I posted about my experience on social media, and soon enough, it gained momentum. Students I hadn't even met or known personally began to share it and leave behind comments. I received several personal messages from others, who were sharing their own experiences for the first time. It made me realise that I was not alone, and people were wanting to speak out together. In fact, in a university setting, BME students end up feeling isolated. In some cases, there are mechanisms to address complaints on racism. But how can one be assured of anonymity, when you are probably the only black student in your department? The online medium helps break these silences and build solidarity networks.

Q As several thousands of people have taken to the streets globally to protest about racism, what should be the role of an ally?

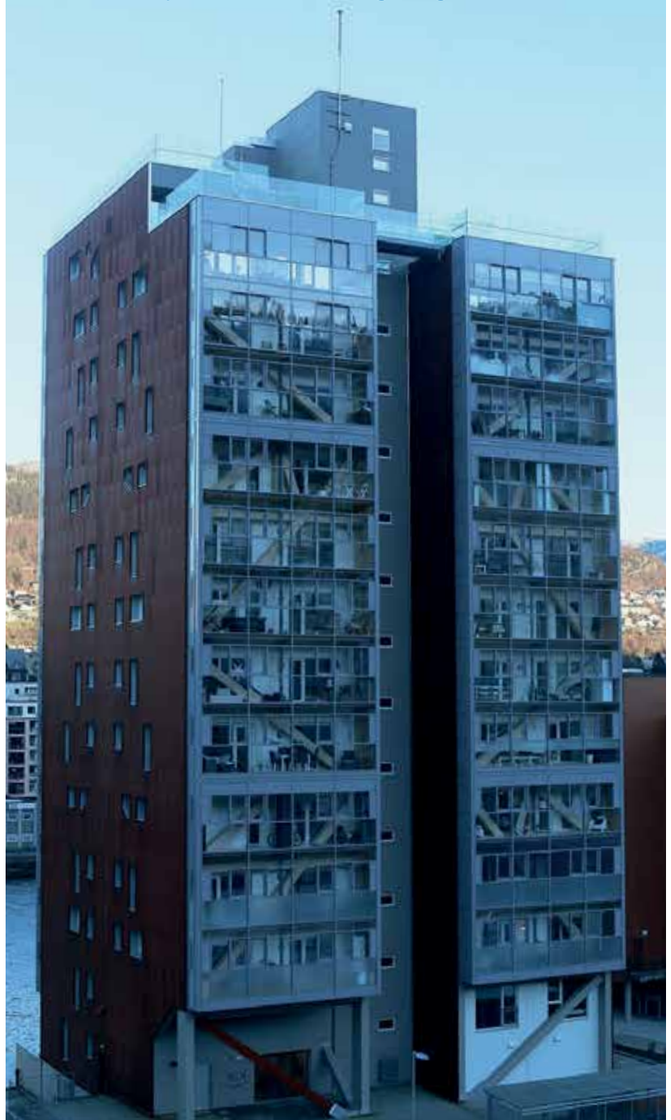
It makes me happy to see diverse populations protest in solidarity. It is important to remember that there are several ways we can protest that hold weight. Which businesses we support, which politicians we follow, which conversations we have in private with close friends and family, they can all be a form of protest. This is also a perfect time to listen more than talking, and ask how you can help.

Collin Edouard
2019, USA, MMus Music

FROM CARBON EMISSION TO CARBON CAPTURE:

Why the World Needs More Timber Structures

Human beings have been constructing buildings with concrete for over 2,000 years. But concrete is the third largest carbon dioxide emitter in the world, contributing up to 2.8 billion tonnes of it into the atmosphere each year. As the world moves to limit the effects of climate change, one construction material that predates concrete is getting a revival: timber.



Timber has been given a new life thanks to the innovation of new timber construction materials such as cross-laminated timber (CLT) and glued-laminated timber (glulam). These new forms of timber materials are stronger, allowing for the construction of multi-level structures such as the 16-storey Treet Building in Bergen, Norway.

While the finished concrete product releases a significant amount of CO2 into the atmosphere, a finished timber product still contains within it the atmospheric CO2 it had captured as a tree in the forest.

The premise is simple – trees sequester CO2 from the atmosphere as they grow, we build new structures with these trees preserving the trapped CO2, and new trees are planted which then go on to sequester more atmospheric CO2.

The manufacturing and construction processes for timber products are also significantly less energy-intensive than that of concrete and steel construction materials. The embodied energy for the processing of sitka spruce (a type of softwood) is less than half of that of structural steel. Additionally, constructing with timber is a lot quicker than constructing with concrete or steel, leading to significant energy savings.

However, given these benefits, many still raise concerns regarding deforestation, fire and rotting. The first concern, deforestation, can be addressed through proper policy interventions. Recent examples from the European timber industry show that it is possible to harvest trees sustainably, by planting more trees as old ones are chopped down and implementing global certification schemes for timber suppliers. The concerns of fire and rotting are addressed by chemical treatments. Additionally, timber structural materials form a layer of ash that may insulate the rest of the wood such that it may even perform better than steel at high temperatures.

In a time where we are forced to redefine our ideas of what is normal, there exists a golden opportunity for governments and corporations to pivot to new, green industries. A greater shift to timber construction would create an industry of growing more trees rather than the current practice of only chopping them down.

Shobana Sivanendran
2013, Malaysia, PhD Engineering

Serving the Underserved

Robert Rivers
2003, PhD Chemistry

A common theme in Robert Rivers' life is a commitment to helping others, from those living in poverty in South America, to underrepresented communities in science.

As Rivers says, "too often some of the most talented individuals in our workforce either don't have opportunities or access". In the summer of 2009, he and Yenny Delgado co-founded the Umbrella Initiative Foundation to serve as a metaphorical umbrella for a variety of initiatives focused on education of at-risk children in rural areas of the Andes. A decade later, more than 200 public schools have participated; 3,500 people have volunteered; and over 20,000 children in Haiti, Bolivia, and Peru have been reached by literacy and academic reinforcement initiatives to like the 'Backpack Project' and 'Super Readers'.

At the NIDDK, among many other roles, he is program director in the Office of Minority Health Research Coordination and leads both the Short-Term Research Experience Program for Underrepresented Persons (STEP-UP) and F31 Diversity Fellowships. "One of my missions" he says, "[is] to ensure that talent is not squandered based on zip code, race or whether someone has extra home life responsibilities."

Democratising Genomics Research

Dan Greenfield
2005, Australia, PhD Computer Science

Dan Greenfield is the CEO of PetaGene, a genomics company that produces a suite of products that tackle challenges in personalised medicine, making unwieldy genomic data from sequencers smaller, better and faster, to reduce costs, improve analysis and speed up collaboration.

Started in 2015, PetaGene began to grow very quickly. By 2016, the idea had been exhibited at Bio-IT World in the US and won Best of Show. That brought lots of interest and investment, enabling the company to scale up and properly commercialise. It has since managed to win major customers, including AstraZeneca and is starting to work with national health programmes and systems. PetaGene now has 17 members of staff and offices in the US and the UK as well as individuals working in Serbia, India and Spain. Some members of the team and advisers have been Gates Cambridge Scholars, like Dan.

Dan became interested in the rapid growth in genomics and the potential it has for personalised medicine while he was pursuing his PhD in Computer Science at Cambridge University. He noticed that, while the cost of sequencing was becoming more economical, that of data transfer and storage was still high. "We were keen to explore how to address this and help democratise genomics research," he says.

Aiming for the Moon

Kayla Barron
2010, USA, MPhil Engineering

In December 2019, Gates Alumna Kayla Barron finished her training on the Artemis programme at NASA, and is now one of a small but growing cadre of female astronauts who are vying to become the first woman to set foot on the Moon by 2024.

Kayla did an MPhil in Nuclear Engineering at the University of Cambridge after doing her undergraduate training at the US Naval Academy. She worked as a Submarine Warfare Officer and was a member of the first class of women commissioned into the submarine community. A year after her MPhil, she returned to the Navy where she completed three strategic deterrent patrols while serving as a division officer aboard the USS Maine, a ballistic missile submarine. It was while she was thinking about what to do next that she met an astronaut who had been to the International Space Station. And a few months after, Kayla stood among the 11 NASA trainees in her class who were chosen from 18,000 applications.

Kayla hopes she will get a chance to get to the International Space Station before it is due to be decommissioned in 2024. At the moment though, she is waiting her turn and working in mission control as a communicator and on space suit design. Born in Pocatello, Idaho, Kayla is married to fellow Gates Cambridge Scholar Tom Barron [2010].

Lost in (RNA) Translation

Ananth Kumar
2015, India, PhD Biological Science

Ananth Kumar has been chosen from a pool of applicants from more than 50 countries to begin a three-year Human Frontier Science Program (HSFP).

The postdoctoral fellowship is awarded with the aim of encouraging innovative interdisciplinary life science research and promoting international collaboration. In line with HFSP's mission, the newly selected fellows will be carrying out research in a new field of biology in a country different from that of their PhD studies.

As a Gates scholar in the lab of Prof Lori Passmore at the Laboratory of Molecular Biology (LMB), Kumar studied the molecular architecture and activity of large multiprotein machinery involved in processing messenger RNA (mRNA). Ananth will apply the methods he learnt in the LMB to study long non-coding RNAs (lncRNAs) while in Pyle's laboratory at Yale. Kumar explains that "DNA is transcribed into mRNA, which is translated into proteins. However, the majority of DNA does not encode for protein; some of this DNA is transcribed into long noncoding RNAs, which do not require translation into proteins for their function." Several diseases, including cancer, are associated with lncRNAs.

Gates Cambridge Scholars have a way of coming together

Over the past year, we have held over thirty events in cities from Washington, D.C. to Sibiu, London, Geneva, Beijing, and beyond. These events ranged from an inaugural Town Hall meeting in June 2019, connecting alumni physically and virtually in San Francisco, New York, Berlin and living rooms around the world, to welcome parties for new scholars in cities from Amsterdam to Seattle, as well as a September alumni weekend in Shanghai.

A highlight of the alumni calendar was the second Gates Cambridge Memorial Lecture at New York City's Tenement Museum on 5 October 2019, featuring the Lauren Zeitels Keynote by recent President of Planned Parenthood Dr. Leana Wen. Understanding the Memorial Lecture as an annual opportunity to celebrate community and those we have lost, this year's lecture was dedicated to Gates Cambridge alumna Dr. Silvia Breu (1976–2018). Alongside the evening lecture, we had a set of panels and lectures by local alumni reflecting on the intersection of community, arts and public health.

Each year, we look for new ways to get alumni involved and to bring our alumni together. A year ago, we introduced a new Collaborative Grants initiative to foster ideas and sponsor academic events. The program has led to an array of exciting, joint scholar-alumni events. These included the *Gates Cambridge Peacebuilding Network Launch Event* (Cambridge), *Human Computer Interaction for Development* (Mumbai), and *Putting City Data to Work: What Can Smart City Development Do for Human Development?* (London). We look forward to this year's selected events, ranging from sustainable energy in London to feminism in Seoul to a global climate symposium co-hosted by alumni around the globe.

Every event is made possible thanks to the energy and investment of our volunteer board and regional directors, as well as the alumni who took part as organisers, panellists, and attendees. As the Board, Trust and Gates Cambridge community look ahead to the 20th anniversary of the Gates Cambridge Scholarship in 2020–2021, we look forward to seeing alumni out in force.

As another year draws to a close, we would like to extend our thanks to the Trustees for their support of the GCAA and to you, our alumni, who make this community a pleasure to serve. We look forward to building ever closer ties from Cambridge to our wider communities. If you have an idea or would like to get involved in hosting or initiating new events, please be in touch (co-chairs@gatesalumni.org).

Anna Kathryn Kendrick
2011, USA, PhD Spanish

Devinn Lambert
2013, USA, MPhil Biological Science (Plant Sciences)

The Gates Cambridge community is a passionate, kind and thoughtful group of scholars, supporting each other to tide over these unprecedented times.

Upon our return from Orientation in October, Scholars led meaningful engagements such as discussion groups focusing on what it means to improve the lives of others, a sustainability working group, bouldering, a fiction book club, and a creative writing group.

The Michaelmas term started strong with the Day of Engagement, when more than 60 Scholars came together to give back to the local Cambridge community. This year, we partnered with various local initiatives and charities including Girls in STEM, Jimmy's, Student Community Action, and CamCRAG. Other memorable council events included a term trip to London, a fieldwork panel, Alumni week, and Scholar Stories.

In November, we held our annual Gates Gala that was attended by over 200 people. The venue was decorated beautifully, inspired by the theme "Four Seasons," and had entertainment such as salsa dancing, henna, silent disco, and live jazz music. This year's Gala focused on making such a large event more sustainable by reducing paper waste and encouraging rideshare options through coach hire.

With the start of the new year came many exciting events, both Council-organised and Council-supported through our Scholar Support Fund. Highlights include our Scholar-Alumni formal held at St John's College, our BME in STEM Internal Symposium, the Lent term trip to the Cotswolds, First Aid training sessions, Lunar New Year celebrations, an architecture workshop for children, and community potlucks.

In the Easter term, we organised the Weekend of Research, which moved online due to the COVID-19 pandemic. Spanning four days, it consisted of a range of diverse and meaningful presentations and panel discussions. The term also marked our yearly Learning for Purpose Skill-a-Thon, a two-day event focused on personal and professional development, as well as Pitch Your Passion, an event where scholars present start-up, non-profit, and business ideas to Gates alumni. In the longer term, we are excited to begin the 20th anniversary of the scholarship in Michaelmas 2020, with plans to celebrate the 20th cohort and connect Gates scholars and alumni across the globe with a variety of online and in person events.

This year has been unusual in that the consequences of the COVID-19 pandemic have been omnipresent in Cambridge and globally. In a community of international scholars, whose homes and families are not in the UK, managing the uncertainty of COVID-19 has been particularly challenging. However, Gates scholars continue to impress with their resiliency and their commitment to do everything in their power to prevent overburdening the health care systems both at home and in the UK, while remaining community-focused and supporting each other. Truly, Gates scholars have and always will be remarkable people, and we as a Council are proud to work with them.

Andrea Kusec
2017, Canada, PhD Biological Science at the MRC Cognition and Brain Sciences Unit, Council President

Nora Martin
2017, Germany, PhD Physics, Council Vice-President

WEEKEND OF RESEARCH

WHAT LESSONS DOES THE COVID-19 PANDEMIC HOLD FOR THE GLOBAL HEALTH SYSTEM?

The Gates Cambridge Weekend of Research went online this year due to the COVID-19 pandemic and included a Gates Cambridge Alumni Association Online Global Health Meeting.

The meeting consisted of three interdisciplinary panel discussions. The first, on tackling the COVID-19 pandemic, kicked off with Salma Daoudi who spoke of the potential political and social impact – from rising nationalism to increasing social inequality – of COVID-19, with particular reference to Africa. Daoudi said health should be a core security issue and the global health agenda needed a wider focus "on building sustainable health systems which could absorb the shocks of future pandemics".

Emily Jordan, co-founder of Intrepida, described how their recently launched product, Ancora.ai, simplifies and democratises the process for accessing COVID-19 clinical trials.

Stephen Kissler presented modelling of historic pandemics to show potential patterns of infection in the absence of longitudinal data on COVID-19. He said modelling could also be used, for instance, to model the impact of policies such as social distancing in diverse settings.

All three agreed that greater democracy, including in access to research and which populations get studied, was needed.

The next session was on the role of pharmaceutical companies in ensuring access to medicine. It covered best practice in global access to medicine and how COVID-19 could open up new models based more on stakeholders than shareholders. One speaker called for a wartime mobilisation for COVID-19 which would be "less space race and more international space centre" that is less about who is first and more about collaboration. There was also discussion of the need for the scaling-up process in drug development to be speeded up to avoid space race type battles.

> Health should be a core security issue and the global health agenda needed a wider focus "on building sustainable health systems which could absorb the shocks of future pandemics".

The third panel focused on health innovation. Sabrina Anjara spoke about her research on increasing mental health care access through primary health settings in Indonesia. She said issues such as inequality, social identity and traditional beliefs about mental illness all contributed to access issues and that healthcare programmes needed to take account of the local context.

Isaac Holeman spoke of how his company Medic Mobile had responded to COVID-19 by developing an open source COVID-19 community health toolkit to ensure vital primary healthcare settings had the information they needed to keep health workers safe.

And Paulo Savaget spoke of how hacking and innovative workarounds could help save lives, giving the example of a project in Zambia which saved thousands of people from dying by piggybacking diarrhoea medication on the back of Coke distribution networks to rural areas.

Mandy Garner
Communications Officer,
Gates Cambridge Trust

PROFESSIONAL UPDATES

Scholars and alumni from across the community share their professional activities and accomplishments.

2006

Justin Bangs (USA, MPhil, Society, Environment & Development) has joined the School District of Philadelphia as an Assistant Director supporting transformation of school climate and safety through the Broad Residency in Urban Education.

2010

Anne Heminger (USA, MPhil Musicology). After finishing my PhD in musicology at the University of Michigan in 2019, I accepted a tenure-track job as Assistant Professor of Music at the University of Tampa, where I'm now teaching music history and theory.

2011

Anna Kathryn Kendrick (USA, PhD Spanish). This January, I published a monograph entitled Humanizing Childhood in Early Twentieth-Century Spain. Bridging Spanish intellectual history, literature, and history of education, it exposes how the study of the child informed Spain's debates on humanism and national culture. I am grateful to the Gates Cambridge Trust for its support of my PhD, from which this book developed.

Devani Singh (Canada, PhD English). Devani Singh is Principal Investigator on an 'Ambizione' project grant awarded by the Fonds National Suisse and held at the University of Geneva. Her project, 'To the Reader: The English Preface in Print, c. 1475–1623', is a study of the emergence of the letter to the reader in early modern English books.

2012

Brielle Stark (USA, PhD Clinical Neurosciences). Enjoying tenure-track life at Indiana University, setting up my lab and publishing papers on neural mechanisms of language production through the lens of aphasia! I was honored to recently receive an American Speech Language Hearing Foundation New Investigator Award in November 2019.

2014

Callie Vandewiele (USA, PhD, Latin American Studies) took up a lectureship in the newly founded Global Studies program at the University of Auckland after finishing her PhD in the summer of 2019.

2015

Eric Cervini (USA, PhD History). His book 'The Deviant's War: the Homosexual vs the United States of America' published in June 2020 joined the New York Times' Best Seller list, the first LGBTQ+ history book to make it to the list in 27 years.

Gabriella Heller (USA, PhD Chemistry) Named one of 22 new Schmidt Science Fellows awarded by the philanthropic organisation Schmidt Futures, in partnership with the Rhodes Trust.

Matthew Kuan Johnson (USA, PhD Philosophy) wrote the target article for a special issue on joy of the Journal of Positive Psychology (Vol 15:1, 2020). The issue featured his target article, along with ten response articles written by leading psychologists, philosophers, and religious studies scholars. One response article (Watkins 2020) posits that just as the field of the psychology of gratitude was "effectively launched" by one paper, that "Johnson's [target article on] joy may well accomplish the same purpose for the budding science of joy."

Ananth Kumar (India, PhD Biological Science) Among 65 outstanding early-career life scientists chosen for the three-year Human Frontier Science Program (HFSP) awarded by the International Human Frontier Science Program Organization.

2016

Georgiana Epure (Romania, MPhil International Relations and Politics) is now Aryeh Neier fellow at the Open Society Justice Initiative. She is based in London and works on human rights advocacy and strategic litigation on economic justice and counter-terrorism.

Alex Kong (USA, MPhil Biological Science (Pharmacology)) "Co-Lead Author on the first ten-year analysis of pharmaceutical companies' actions on access to medicine, published by the Access to Medicine Foundation:" "Are pharmaceutical companies making progress when it comes to global health?". "Accepted for a PhD in International Health at Johns Hopkins University."

Leor Zmigrod (Netherlands, PhD Psychology). Listed on Forbes 30 Under 30 for the Science and Healthcare category and received the Gluhsko Prize from the Cognitive Science Society as well as the 2020 Young Investigator Award from the European Society for Cognitive and Affective Neuroscience.

2017

Jennifer Jia (Canada, PhD Clinical Neurosciences). In October 2019, Jeniffer won a £2,000 grant at the UK Business Start-Up Competition sponsored by the SJL Foundation for her start-up business venture, Emporsand.

Andrea Kusec (Canada, PhD Biological Science at the MRC Cognition and Brain Sciences Unit) won the Social Impact Award from the University of Cambridge's Vice-Chancellor.

2018

Ramit Debnath (India, PhD Behaviour and Building Performance Group). Co-author of the study 'India nudges to contain COVID-19 pandemic: a reactive public policy analysis using machine-learning based topic modelling' that was published in Computers and Society in May 2020.

Professional Updates continued on back cover.

2019

Angela Bai (USA, MPhil Architecture and Urban Studies). To be published in forthcoming book provisionally titled Nation Building: A Field Guide from Tanzania with Reinier de Graaf et al.; accepted grant for Re-Materializing Housing Workshop 2020 (Norman Foster Foundation); launching N/A, an interdisciplinary design studio and practice in NYC.

Emiliano Cabrera-Rocha (Bolivia MPhil Latin American Studies). Participated in the Paris Peace Forum to represent 'Catalyst: Rethinking the Americas', an organisation he has co-founded with a group of activists and scholars from across the Western Hemisphere.

Dr. John Clark (Australia, PhD Paediatrics). Awarded £24,690 grant from Addenbrooke's Charitable Trust – For the Rapid Assay for Sick Children with Acute Lung infection Study (RASCALS) and evaluation of infection and host response to COVID-19 in hospitalised children.

Stephen Gadomski (USA, PhD Haematology). Lead author on a new study published in Cell Reports on the behaviour of endothelial cells.

Anna Guasco (USA, PhD Geography). Her paper on museums, extinction narratives, and justice has been accepted for publication in Environment and Planning E: Nature and Space.

Cristian Larroulet Philippi (Chile, PhD History and Philosophy of Science). Published an article entitled "Well-Ordered Science's Basic Problem" in the journal Philosophy of Science (April, 2020).

Andrea Luppi (Italy, PhD Clinical Neurosciences). Published two papers (one in Nature Communications) and gave a talk at the Organization for Human Brain Mapping 2020 conference. Also awarded the 2020 Bridge Grant by the Complex Systems Society, and selected for the Alan Turing Institute Enrichment Scheme.

William McCorkindale (Hong Kong, PhD Physics). Attended Alan Turing Institute workshop on Data Science for Physics, had 2 papers accepted at ICLR 2019 and ICML2020 workshops on Fundamental Science in the AI era and ML Interpretability for Scientific Discovery, respectively.

Avani Tandon Vieira (India, PhD English). Awarded the prestigious Cumberland Lodge Scholarship which recognises doctoral students committed to promoting social progress. She has also been selected to present her work at Rutgers University, the MLA Convention, the University of Gottingen, and the University of York.

GATES Cambridge

T 44 (0) 1223 338467
F 44 (0) 1223 577004
E eic@gatescouncil.org

Ground Floor, 33 Bridge Street
Cambridge CB2 1UW
United Kingdom
www.gatescambridge.org