



NatureVolve

Bridging science & art

**Special focus:
Biology and medical
mysteries..**

Issue 6

Sharing..

**Mysterious
myopathy in
Hong Kong**

**Chloroquine for
Coronavirus?**

**Make-up to
make SciArt**

& more

Explore..

Science

Conservation

Scicomm

Art

Written Word

Background: OpenClipart-
Vectors / 27407 images Pixabay.



Find us on

[Twitter](#) [Facebook](#) [LinkedIn](#)

Copyright notice

© NatureVolve digital magazine - all original content providers retain the copyright to their work.
No materials may be reused without permission.

We would like to thank the following who contributed to this issue:

- Hencher Lee
- Kerry McPherson
- Suwan Jayasinghe
- Benjamin Gearey
- Tina Claffey
- Phil Humphreys
- Jazmin "Sunny" Murphy
- Tim Snow
- Chiara Di Ponzio
- Francesca Mircola
- Kylie Dillinger
- Kelly Bullock
- Mojgan Matloob
- Julie Rauer
- Bruce Gemmell
- Neus Figueras
- Sam Illingworth
- Jacob McAtear
- Annelise Lords



Editor's note



Welcome to the complete digital copy of NatureVolve issue 6

We are pleased to share the complete digital version of issue 6 with you; showcasing works in not only science and conservation, but fine art and written word.

Times have been especially hard for everyone during the Covid-19 pandemic, so we are especially thankful to contributors who have nonetheless stepped out to share their projects and perspectives.

With global concerns in mind, issue 6 takes a special look at the ideas of researchers in medicine and biology.

We amplify thoughts related to the concerns of today, including the coronavirus pandemic, plastic pollution, wildlife management, and more.

As technology advances, issue 6 includes two contrasting perspectives on 3D scan and print technologies, used in very different contexts; one within regenerative medicine, and the other in archaeology outreach.

NatureVolve creatively communicates science with wider audiences, not only as a publication, but a community. Thanks to all readers and members who have joined us in our mission to bridge the sciences and arts, while sharing ideas from both worlds.

Please enjoy the complete copy of issue 6!

If you think you would like it in print, you can now [make an order](#), whether you are in the [UK](#), [USA](#) or [beyond](#).

Best wishes,

Clarissa Wright





Contents

SCIENCE

- Finding the root of a mysterious myopathy in Hong Kong [5](#)
- Chloroquine for Coronavirus: miracle drug or hype? [9](#)
- Facing the challenge of rebuilding functional tissue [12](#)

CONSERVATION

- Preserving peatlands for our past heritage and today's environment [16](#)
- Plastic pollution awareness in the classroom [21](#)
- Why the push to stop wildlife consumption isn't about wildlife [22](#)
- Addressing wildlife conflicts is about attitude [24](#)

SCICOMM

- Making SciArt with make-up [27](#)
- Accessing ancient artifacts with 3D scanners [30](#)
- Creating hyper-realistic neuroscience illustrations [33](#)
- Designing virtual tools to teach science post-pandemic [36](#)

ART

- Art Gallery: Art Science Complex [40](#)
- Julie Rauer [40-42](#)
- Bruce Gemmell [43](#)

WRITTEN WORD

- Neus Figueras [45](#)
- The Heron in the Woods [48](#)
- Genetic Unmarking [49](#)
- Who the Genie is? [50](#)

EXTRA

- NatureVolve announcement [51](#)
- Messages from supporters [53](#)

The image features a dark blue background with a white network of dots and lines, resembling a molecular or data structure. A central brushstroke graphic, composed of many thin, overlapping lines, is positioned below the word 'SCIENCE'.

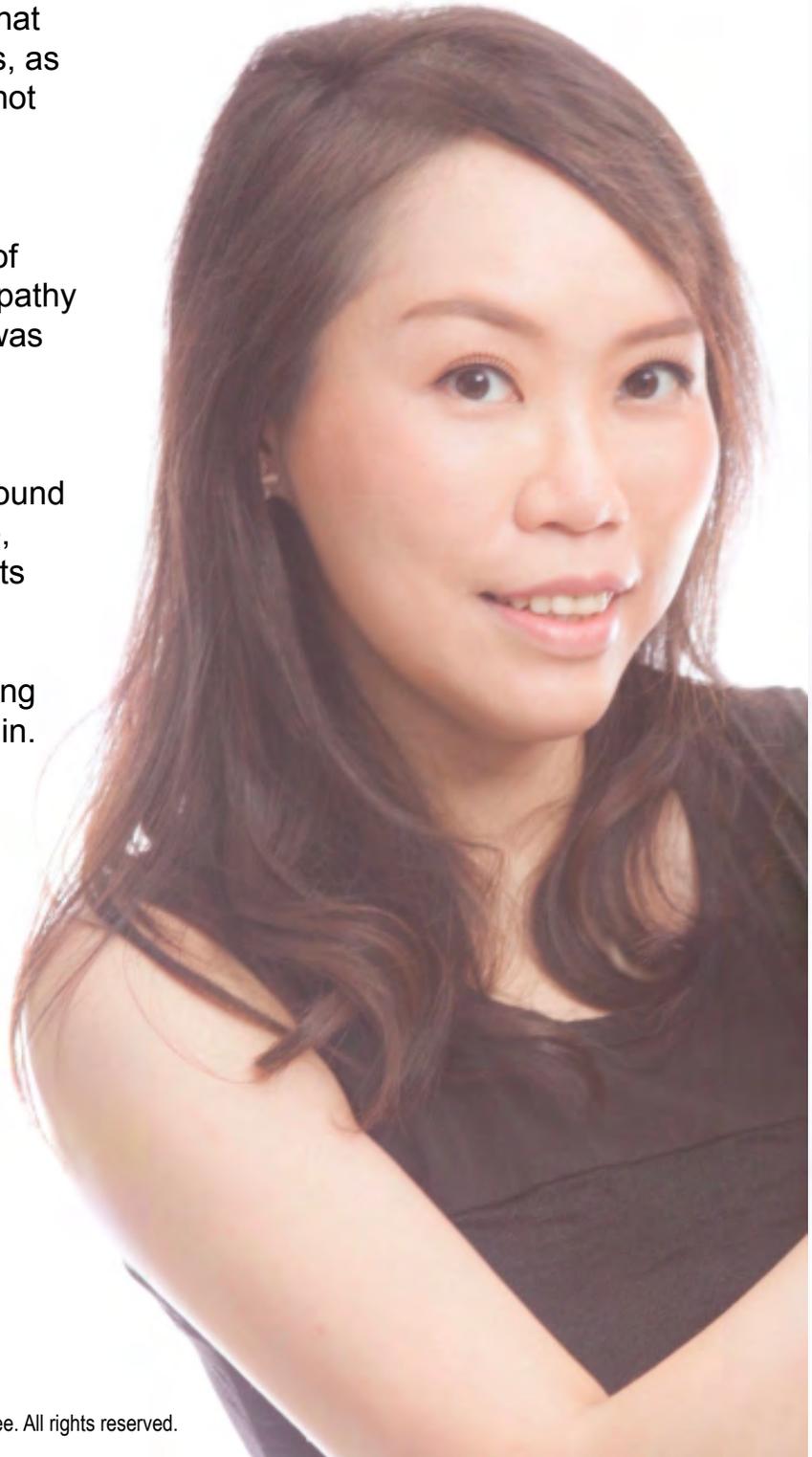
SCIENCE

Finding the root of a mysterious myopathy in Hong Kong

Myopathy is a disease that causes muscle weakness, as a result of muscle fibers not working correctly.

Dr Hencher Lee works in a public-funded hospital of Hong Kong where a myopathy with an unknown cause was observed in Hong Kong patients.

After years of mystery around the source of the disease, as more and more patients stepped in with similar issues, Dr Lee and her team discovered something unexpected about its origin.



Above: Portrait of Dr Hencher Lee. © Hencher Lee. All rights reserved.

Q & A - Hencher Lee

Please tell us about your academic background and professional experience working in a public-funded Hong Kong hospital?

I completed medical school in The Chinese University of Hong Kong and started my postgraduate fellowship training in chemical pathology and genetic pathology afterwards. I have obtained fellowship in chemical pathology under The Hong Kong College of Pathologists (HKCPATH) and The Royal College of Pathologists of Australasia (RCPA), and fellowship in molecular genetics under The Royal College of Pathologists (RCPath). I have also obtained certifications for International Technologist in Molecular Biology by the American Society for Clinical Pathology (MB(ASCPi)) and European registered Clinical Laboratory Geneticist (ErCLG) (affiliated). My part-time studies have earned me a Master of Science in Analytical Chemistry from Hong Kong Baptist University, a Master of Arts in Health Care Ethics and Law from University of Manchester, and a Master of Science in Molecular Pathology and Genomics from Queen Mary University of London.



“..we regard our experience valuable and would always like to document these in the medical literature for the reference of other medical professionals.”



Top right: A corner of Dr Lee's laboratory. © Hencher Lee. All rights reserved.
Directly above: Dr Lee at work. © Hencher Lee. All rights reserved.

Working in a clinical diagnostic laboratory means that we handle specimens sent to the laboratory from real patients. We oversee the day-to-day laboratory operations and issue interpretative reports for sophisticated tests like genetic tests and toxicology tests. We develop new diagnostic tests when the clinical need arises. Often, we do not have dedicated funding for research and we lack resources for analyses beyond our scope of diagnostic tests. But definitely, we regard our experience valuable and would always like to document these in the medical literature for the reference of other medical professionals.



were tested one after the other, and as a result we reached the genetic diagnosis after a few years. At that time we already had another family approached us for a similar clinical problem, which were also very quickly proven another group of affected patients. Cases kept coming in and very soon we understood that this is a frequent genetic variant limited to ethnic Chinese patients in our locality. So far, we have confirmed the pathogenic variant in 34 patients in nine families. In our journal article published in *Clinical Genetics* in May 2020 we studied the clinical characteristics of our cohort of cases and demonstrated that the pathogenic variant is a founder variant, i.e. it was probably inherited from one single ancestor of these patients.

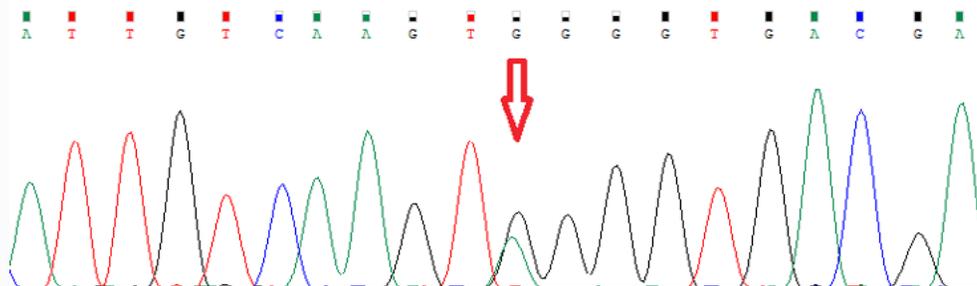
How did you discover the source of the unknown myopathy you observed in Hong Kong Patients?

In 2008 our neurologist introduced the first patient to our team. The gentleman had weakness in his 50s but he was alarmed by the strong family history that his father and paternal relatives also had a similar problem which started in the 50s and caused deaths in the 60s. So obviously this worried him. His muscle biopsy findings were somehow not typical of the pathology so we did not have any clue, until we gathered the slides of muscle biopsies from all his affected family members and our histopathologist decided it looked like a certain type of myopathy (myofibrillar myopathy) – yet still the condition is heterogeneous and a lot of genes could be implicated. Back then no large-scale sequencing technology was available and the genes

Is this disease unique to Hong Kong populations? If so, why do you think this is?

We very soon realized this *FLNC* variant is a common pathogenic variant in Hong Kong Chinese patients when a large majority of patients with adult-onset proximal muscle weakness as well as a strong family history would harbor this pathogenic variant.

The local prevalence is significant and we believe the allele frequency of this variant is not low locally. Interestingly, it is never described in patients in other parts of the world, and it is absent in multiple datasets of normal populations so far. From these, we postulate that this is a founder variant limited to Hong Kong Chinese. A similar *FLNC* variant is also known to exist in Germany, leading to a higher prevalence of disease in their population as well.



Top, center: Dr Lee receiving a souvenir from the Chairman of the Organizing Committee after speaking at the 4th Medical Education Conference of Hong Kong Academy of Medicine. © Hencher Lee. All rights reserved.

Directly above: The G-to-A change in the *FLNC* gene which is believed to underly a major myopathy in Hong Kong Chinese. © Hencher Lee. All rights reserved.

Could your research ease the fears that the disease is a ‘family curse’?

Our patients are often concerned about the strong family history which has been known to them for a few decades. They saw that their affected family members became crippled due to the devastating nature of the disease, one after another, and died of it.

The psychological impact is understandably strong and they have a deep-rooted fear for the condition, with no way to know if they themselves would develop it or not. The molecular diagnosis definitely ends the diagnostic odyssey and gives a scientific basis for the disease.

Proper genetic counselling enables them to make their own choices of whether to test themselves and have better planning, and they now know preimplantation genetic diagnosis is technically feasible and they could end the “curse” at their generation if they opt to. In this era the genetic information also allows them to search online by themselves for relevant information including latest research on potential therapies. This could be a kind of patient empowerment which is achieved via making the correct genetic diagnosis.

How can others support you to raise awareness of the origins of the disease and help to find treatments?

So far the awareness for this particular condition is not high among medical professionals as well as in the public in Hong Kong, and we believe this particular condition is still underdiagnosed.

For instance, our patients told us that some distant relatives of theirs would regard this as escalated aging and refuse to seek medical advice at all.

We hope the local clinicians could be aware of the prevalence of the condition in this locality and refer the suspected patients for appropriate genetic counselling and testing.

When we have a certain number of patients, we also hope that pharmaceutical companies might be made aware of the condition and might consider development of treatments.

Final thoughts

Hencher’s medical team have uncovered an unexpected cause of a mysterious disease, considered by some to be a ‘family curse’. The disease has not been known in other populations of the world, and is thought to derive from a single family ancestor. The team hope their discovery will raise awareness of this discovery for medical professionals across the world.

Bio

Dr Hencher Lee’s main duties include provision of interpretative reporting and consultation services, in addition to supervising laboratory operations.

She also holds honorary teaching posts in the two local medical schools and teaches both undergraduate and postgraduate students. Her research interests include neurogenetics, inborn errors of metabolism and genetic counselling.

She has co-authored a book chapter as well as more than 40 peer-reviewed articles in indexed journals.

Links

[LinkedIn](#)

[ResearchGate](#)

[ORCID](#)

Email:
leehch@ha.org.hk

Chloroquine for Coronavirus: miracle drug or hype?

by Kerry McPherson

Chloroquine, an antimalarial drug and a proposed Covid-19 treatment, is currently a highly debated pharmaceutical. Sifting through the media's coverage on chloroquine is frustrating.

Unfortunately, many news articles report little to no scientific information about the drug, choosing instead to report it as a political issue. CNN, with a reputation for its democratic bias, reports that Trump's optimism of the drug is dangerous rhetoric.

Fox News, notorious for its right-wing ideology, argues that Democrats are spreading misinformation about chloroquine to push their anti-Trump agenda. Mistrusting the media bias, I did my own investigating using solely reliable sources to sort out the information and misinformation of the drug..



What is hydroxychloroquine?

Chloroquine and hydroxychloroquine are antimalaria medicines taken in the form of tablets. These drugs also act as immunosuppressants. For this reason, chloroquine also treats autoimmune diseases such as arthritis and lupus. Chloroquine and hydroxychloroquine are similar drugs; hydroxychloroquine has lower toxicity.

Hydroxychloroquine and chloroquine's patents are expired, and generic drugs are available.

The patent expiration has fueled conspiracy theories that big pharma will not market chloroquine to treat Covid-19 because it is less profitable than a vaccine. However, multiple pharma companies have donated their stocks of hydroxychloroquine for clinical trials and emergency use.

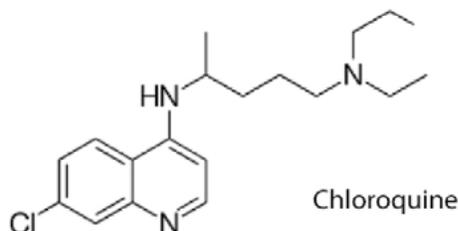
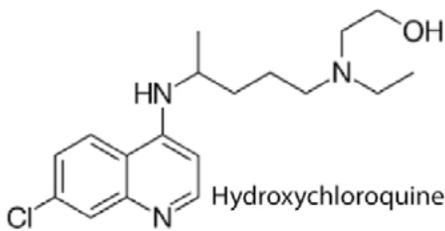
Evidence for chloroquine as Covid-19 treatment

Viruses use our cells as factories to reproduce themselves. They invade our cells, hijack our cell's machinery to replicate itself, and then exit the cell to do it all over again. Antivirals try to stop one of these three steps to block the propagation of the virus.

Hydroxychloroquine and chloroquine have antiviral activity and are currently under investigation for HIV treatment.

We aren't sure why this drug is antiviral, but two theories exist:

- 1) the drug affects the glycosylation of proteins that the virus needs to invade cells,
- 2) the drug disrupts endosome-membrane fusion which impedes the virus's ability to burst out of the cell. Hydroxychloroquine has anti-Covid-19 efficacy in vitro.



From left to right: Chemical formula of hydroxychloroquine, chemical formula of chloroquine. Public domain.

Anecdotal evidence

Anecdotal evidence for hydroxychloroquine is quite prevalent, mostly due to social media. Doctors are claiming they are curing Covid-19 patients with chloroquine. But anecdotal evidence is dangerous; it doesn't take into account numerous factors that affect disease progression:

1. Lies

Although obvious, it is necessary to point out social media posts are often dishonest.

2. Placebo effect

The placebo effect can account for as high as 40% of patients experiencing an improvement in their disease.

3. Correlation vs. Causation

Lessening of symptoms can coincide with other factors besides treatment, including timing, diet, rest, and others.

4. Susceptibility and variability

Covid-19 has a broad range of severity. Many hydroxychloroquine "success stories" might be due to the patient experiencing a mild case of the disease.

Clinical trials

Fortunately, hydroxychloroquine and chloroquine clinical trials are repurposing clinical trials. The FDA already approved the use of one disease, and they are checking if hydroxychloroquine and chloroquine work for another.

These trials take less time and money since we already have data collected about toxicity. If the trials produce promising results, the drugs will release to market quicker than a novel medicine. Two clinical trials yielded promising, yet inconclusive, results. A Chinese study conducted a trial with 62 Covid-19 positive patients; 31 patients were given

hydroxychloroquine, and 31 patients were given standard treatment only. 25 of 31 patients of the hydroxychloroquine treated group and 17 of 31 patients of the untreated group had improved symptoms.

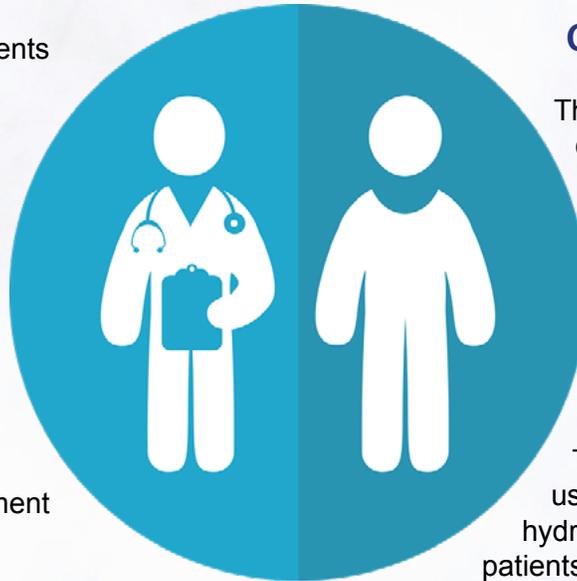
This data suggests treatment may be beneficial, but the difference is not statistically significant. A larger test group is necessary. Furthermore, the presence of the virus after treatment was not evaluated in this study.

A French study tested 36 patients, 20 treated with hydroxychloroquine, and 16 untreated. 70% of treated patients and 12% of untreated patients tested negative for Covid-19 after 14 days.

Unlike the Chinese study, this study has statistically significant results, suggesting that the outcome is not by chance but due to drug efficacy.

However, this study is half the size of the Chinese study. Another notable difference is the French patients received both hydroxychloroquine and azithromycin, a drug that showed promise against the Zika virus.

But take these stats with a grain of salt! Initially, the hydroxychloroquine and azithromycin treated group had 26 patients, 6 dropped out due to death, ICU transfer, nausea, and hospital discharge.



Conclusion

The scientific community is continuing to test chloroquine as a treatment for Covid-19.

The University of Oxford is starting a 10,000 participant study to determine if chloroquine can prevent Covid-19.

The US approved emergency use of chloroquine and hydroxychloroquine to hospitalized patients. Chinese scientists are planning a stage 3 clinical trial for hydroxychloroquine to take place in June 2020.

With unanswered questions and weak data, there is still advocacy to bypass FDA regulations and approve chloroquine for Covid-19 treatment and prevention. Doing so is certainly a risk.

Widespread use of chloroquine may have serious consequences.

After all, chloroquine is an immunosuppressive, it might weaken our defense to the virus. Furthermore, commandeering the chloroquine supply will decrease availability of the drug for those who need it.

And even if chloroquine is safe to use, premature approval will drum up a false sense of security which could lead to a loosening of social distancing and more disease spread.

Bio (guest writer)

Kerry McPherson, M.S is a PhD candidate studying biomedical sciences at UCONN Health in Farmington, Ct. She researches genotoxic chemotherapy resistance.

Kerry is the founder of Bolded Science, a collaborative blog. Along with her lab mates, she also established a STEM education outreach program at her University.

Links

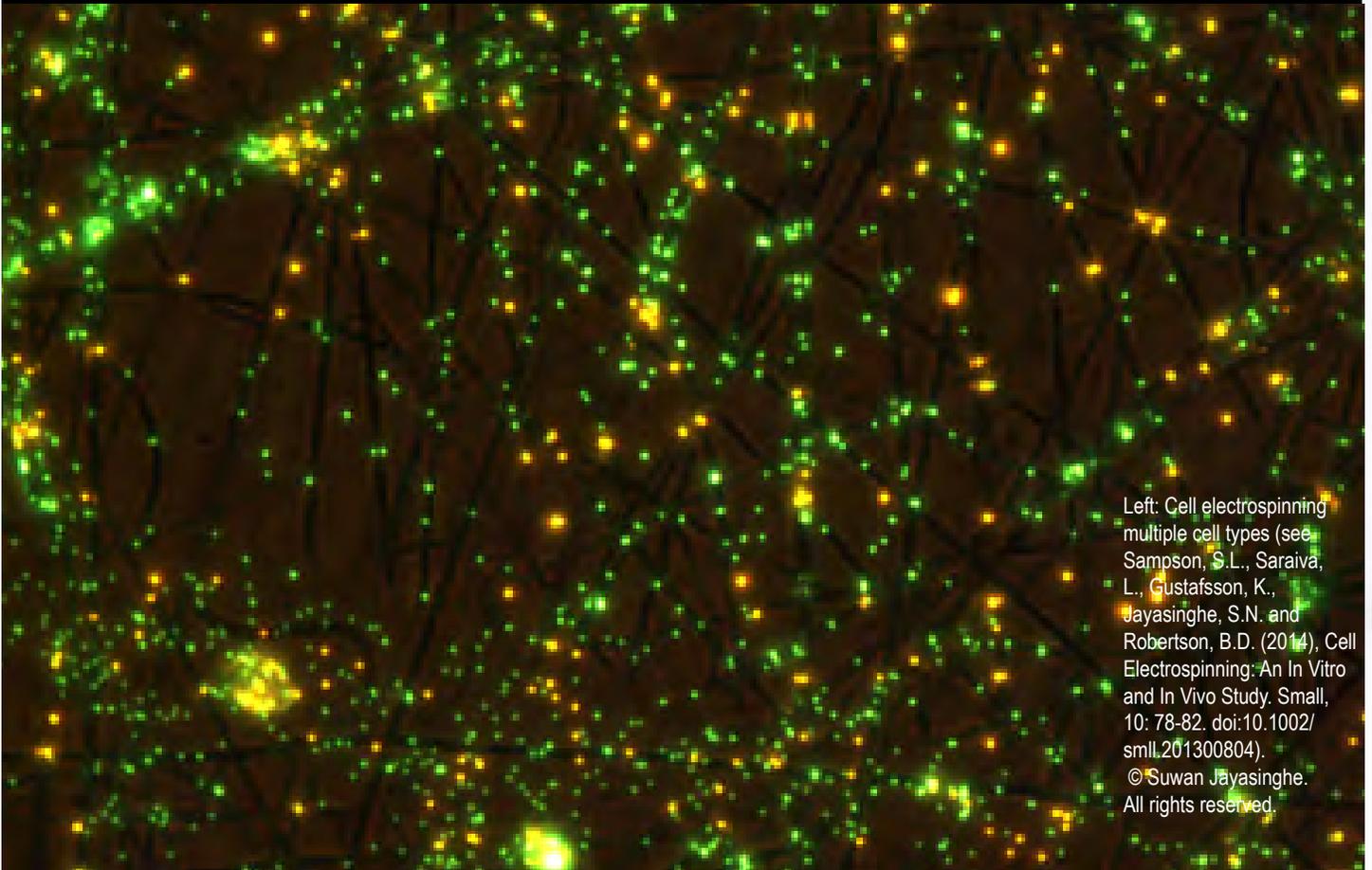
Twitter:
[@KerrySilvaMcpH](https://twitter.com/KerrySilvaMcpH)

Website:
[BoldedScience.com](https://boldedscience.com)

Facing the challenge of rebuilding functional tissue

When organs become damaged, many look to regenerative medicine for answers. New, potential solutions continue to arise in the field, but must be validated. After completing a PhD in materials science, Dr Suwan Jayasinghe began investigating the viability of specialized material processing methods in the creation of functional tissue. These methods include electrospinning and electrospinning which use electrically charged polymer solutions to create structures at the micron, submicron and nanoscale level.

To rebuild tissue, a scaffold structure would normally be used where cells would be placed so that they can communicate and develop. Therefore, the scaffold architecture must be accurate. Have current approaches seen limitations? Can electrospinning and electrospinning offer solutions? Suwan shares some thoughts.



Left: Cell electrospinning multiple cell types (see Sampson, S.L., Saraiva, L., Gustafsson, K., Jayasinghe, S.N. and Robertson, B.D. (2014), Cell Electrospinning: An In Vitro and In Vivo Study. *Small*, 10: 78-82. doi:10.1002/sml.201300804).
© Suwan Jayasinghe. All rights reserved.

Q & A - Suwan Jayasinghe

Please tell us about your background in biophysics and main area of interest at present.

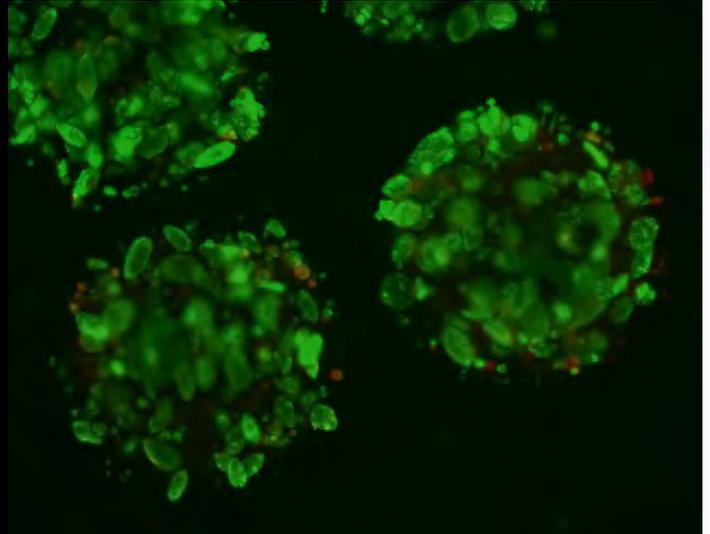
Having completed a bachelors and a masters degree in mechanical engineering at Brunel university I started a PhD in materials sciences at Queen Mary University of London. On completing my PhD I became a post-doc for a short period, subsequently securing a Roberts fellowship which guaranteed a lectureship on completion. On completing the first year of my fellowship I joined UCL and have been at UCL since, where in 2016 I was promoted to the rank of a full professor. My research interests have spanned advanced materials and their processing. In 2005/6 we decided to use novel materials processing tools namely, electrospraying and electrospinning for the direct handling of living cells/ whole organisms with and without other biomolecules in the hope to develop functional three-dimensional tissue which could be used for repairing, replacing and rejuvenating damaged and/or aging tissues and/or organs.

Much to our surprise we discovered that these electric field driven technologies have no deleterious effects at all from a molecular level upwards.

This paved the way for the emergence of the well-established bioplatfroms known as bio-electrosprays and cell electrospinning. These findings have seen us interrogate the technologies alongside the post processed cells and whole organisms in comparison to controls using well-established biomedical and clinical read outs.

Considering the rise of 3D printing techniques, how prominent have they become in the medical field, and are there limitations?

3D printing is a unique technology capable of rapid prototyping advanced designs. The technology is truly revolutionary in that it is a low cost technology capable of manufacturing intricate prototypes for many industries. That being said the technology in the context of directly handling biomolecules and living cells, process which is referred to as bioprinting, has not been so successful. The limitations stem from the



Above: Encapsulated cells within a bead, generated using bio-electrosprays (see Workman, V.L., Tezera, L.B., Elkington, P.T. and Jayasinghe, S.N. (2014), Controlled Generation of Microspheres Incorporating Extracellular Matrix Fibrils for Three Dimensional Cell Culture. *Adv. Funct. Mater.*, 24: 2648-2657. doi:10.1002/adfm.201303891). © Suwan Jayasinghe. All rights reserved.

technology itself as the process uses fine needles which are known to shear molecules and cells within the needles thus causing significant damage to both the processed biomolecules and cells. Many attempts have seen this technology retrofitted in many aspects but this issue persists and has negative effects on the processed biomaterials.

Although 3D printing or bioprinting has these limitations whilst directly handling biomolecules and cells, the technology has been explored and has found its utility in the medical field for reconstructing medical components such as jaw bones to the printing of human architectures such as the skull and brain thus allowing these prototype models to assist surgeons with visualising entry point etc for removing brain cancers etc.

How may your team's studied scaffolding methods contribute to regenerative medicine?

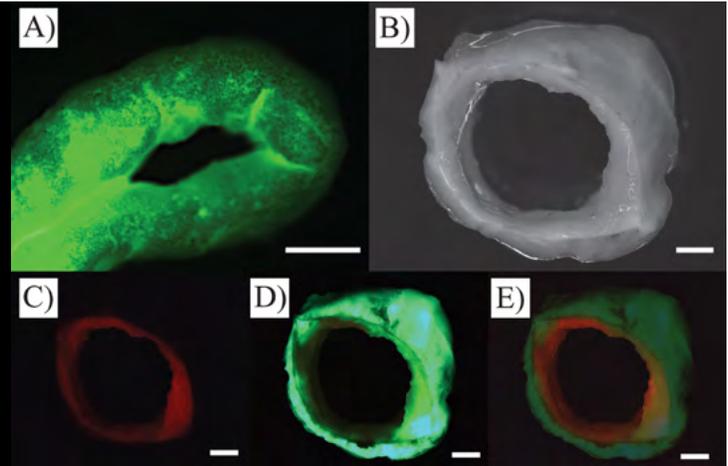
Knowledge in the field of tissue engineering proposes the concept of placing cells in three-dimensional proximity within a scaffold architecture allowing the cells to communicate etc and regenerate a fully functional three-dimensional tissue. This concept however is not fully realized by just placing cells on a 3D scaffold. Many studies have tried to show that there is promise, but recent clinical studies have shown that the mere introduction of cells into a 3D scaffold does not promote the formation of a functional tissue, in fact those studies have resulted in

the loss of human life. In our pursuit for competing with this research problem we explored the ability to electrospin living cells and biomolecules with a biopolymer thus generating a scaffold containing living cells in true three-dimensional throughout the entire thickness of the scaffold. Our initial studies demonstrated that those cells remain viable and indistinguishable with controls, and have not been altered by the electric field from a genetic, genomic to a physiological level. Thus opening this technology as a front running platform for regenerative medicine.

The uniqueness of both bio-electrosprays and cell electrospinning allow the use of large bore needles thus enabling the processing of large volumes of cells in many permutations and combination with other biomolecules, hence enabling the reconstitution of a native tissue from a patient's own cells. Combining our findings with the huge developments unearthed in the cell and molecular biology fields allow one to use patients own cells post manipulation (gene transfection/CRISPR) for reconstructing therapeutics/experimental cells/gene and tissue for transplantations without the need for any immunosuppression. Our collaborations have seen the reconstruction of human native tissues, biological models to truly seeing the light at the end of the tunnel for personalized medicine. The applications of these platforms extend to the freezing of cells and culturing them in three-dimensions amongst others.

Next, what steps lie ahead for further investigating the validity of these methods?

We are currently running clinical trials on advanced wound healing bandages for combatting venous diabetic ulcers and bed sores. Success will see these technologies rolled out as mainstream clinical therapies.



A) Fluorescent image of a reconstructed living vessel, (B) an optical image of the cross-section. Scale bar in panels A and B are 15 mm and 1 mm respectively. Panels C and D demonstrate fluorescent images of the different cell types within the two-core reconstruct. Panel E represents the overlaid fluorescent image of the reconstructed architecture. Scale bars for panels C–E represent 1 mm. (see Jayasinghe, S.N., (2013) Cell electrospinning: a novel tool for functionalising fibres, scaffolds and membranes with living cells and other advanced materials for regenerative biology and medicine. *Analyst*, 138: 2215-2223.) © Suwan Jayasinghe. All rights reserved.

Final thoughts

Regenerative medicine comes with many challenges that modern technologies seek to address. While a promising technology for numerous industries, Dr Suwan Jayasinghe shares thoughts on some obstacles faced by 3D printing techniques for tissue regeneration, and opens up the question of whether electrospinning and electrospaying approaches could help to overcome barriers faced so far. We wish the research team the best for the next steps in their investigations and for the completion of clinical trials on advanced wound healing bandages.

Bio

I am a mechanical engineer who has become a biomedical scientist, having interests in the wider area of regenerative biology and medicine.

My end goal is to see our technologies have clinical ramifications for assisting patients with tissue regeneration complications.

Links

[UCL website](#)

[Google web](#)

[LinkedIn](#)

Email address: s.jayasinghe@ucl.ac.uk

Conservation



Preserving peatlands for our past heritage and today's environment

Peatlands are unique, yet important settings to conserve for their environmental, ecological, and historical value. Over thousands of years, peat helps to preserve ancient artifacts that hide clues about our heritage. These environments also store greenhouse gases, that would otherwise enter the atmosphere and contribute to climate change.

Archaeologist Benjamin Gearey works with artists, environmentalists and researchers in the study and preservation of these sites in Ireland, as explained in our interview, where Tina Claffey's photography is also showcased.



Above: Abbeyleix Bog, Co. Laois: a peatland undergoing 'rehabilitation' led by the local community. Photo: © WetFutures. All rights reserved.
Directly above: Bog cotton landscape Scohaboy. © Tina Claffey. All rights reserved.

Q & A - Benjamin Gearey

In what way do peatlands hold ‘archives’ of past people and landscapes?

The word ‘archive’ can be conceptualized in two ways. Firstly, there is the more literal sense, the archaeological record, in particular organic material such as wood, and the microscopic remains of plants, insects and pollen, preserved in the waterlogged, oxygen poor environments of peatlands. Together these represent records of both cultural and environmental change, which can be measured in millennia for many peatland environments.

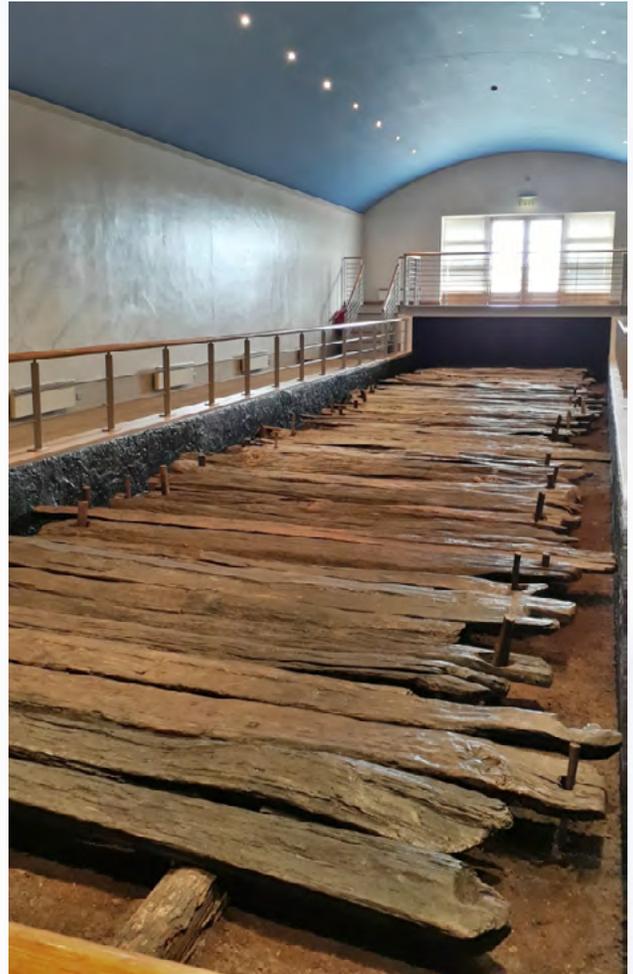
It’s probably fair to say that ‘bog bodies’ or fleshed human remains, are the best known and most striking of these archaeological finds, for example, Tollund Man, Denmark. However, human remains are actually very rare, compared to the rather bewildering array of sites and artifacts that have been discovered, and largely destroyed, by industrial scale peat extraction in Ireland. Few of the impressive timber structures have survived, although a section of the monumental Iron Age timber trackway of Corlea 1 (image to the right) is preserved in a [visitor center](#).

Secondly, they are an ‘archive’ in the metaphorical sense; with the cultural and social significance and role of peat and peatlands, as a part of Irish tradition and inspiration for art and literature: for example, the iconic ‘bog poems’ of Seamus Heaney. But peatlands can also be regarded as ‘contested’ landscapes, peat (turf) cutting has a long tradition and on an industrial scale, has been a provider of employment.

Peatlands past, present and future, cannot be understood without bringing together these different concepts of the ‘archive’ and recognizing the interlinked and complex social role and manifestation of ‘The Bog’. An interdisciplinary approach and perspective is thus essential.

How do you combine different disciplinary approaches in your peatland research?

The WetFutures team spans disciplines from archaeology to geography and social science, but we are unified by our love for the unique nature of peatlands and for communicating their importance as archives for preserving natural history and heritage, alongside the environmental role and function of healthy peatlands. We work closely with other researchers, activists and practitioners, through initiatives such as the interdisciplinary [‘Creative Connections’](#) program,



Top: The conserved section of the Iron Age (2150 years old) timber trackway of Corlea 1. Corlea Visitor Centre, Co. Longford, Ireland
Photo: © WetFutures. All rights reserved.

Directly above: Carving a replica of the Iron Age ‘Ballachulish goddess’
Photo: © Brian MacDomhnaill/Pallasboy Project. All rights reserved.

to develop effective links between academia, artists, curators and teachers (image to the right). Recently, the artist [Kate Foster](#) has been collaborating with the WetFutures team in the Netherlands.

Combining approaches is about balanced learning and not about trying to tell people what they should value. It would be very easy for an individual research interest or theme to drive the overall direction and output of the project. Science and research are important, but we need to engage and communicate beyond the academic sphere and to do that we need to think in different ways. We aim to merge the individual research strands to generate interest and engagement in different ways. We take the perspective that there is no disciplinary hierarchy, approach or perspective that 'leads' the way or gives the 'best' results. There are different and diverse methods to engage and communicate: experimental archaeology offers one such approach.

Please define experimental archaeology and how it utilizes a broad range of creative practices.

Experimental archaeology is a rather slippery concept, at least in terms of its current manifestation! We might very loosely define it as any contemporary exploration of materials, processes or conditions that have relevance to our understanding of past human activity and the archaeological record.

In short, it could perhaps be described as 'learning by doing'. Following a long period when it rather fell out of favor, recent years have seen a resurgence and the establishment of several centers for experimental archaeology (for example the [University of York](#), UK and [University College Dublin](#)). The range of creative practices involved are hugely diverse: woodworkers, blacksmiths, visual artists, ceramicists, musicians.. the list does go on!

Probably the most distinctive feature of the current manifestation of experimental archaeology is that it is open ended, flexible and reflexive. It is as much about mutual exchange of knowledge between creative practitioners, craftspeople and archaeologists as it is about what 'practical' lessons and information we can extract. Experimental archaeology can also be enormously effective in terms of engaging and communicating with different communities of practice.



Top: Archaeological excavations of a drained and cutover Irish peatland. The structures in the foreground are later prehistoric hurdle trackways. © Benjamin Gearey. All rights reserved.

Directly above: Creative collaborations with artists and teachers, thinking through visual representations of peat and preservation. Photo: Brian MacDomhnaill/ Creative Connections. CC BY-SA (Attribution-Share-Alike).

That is something that we are drawing on, following the work of the [Pallasboy Project](#), an ongoing collaboration between archaeologists and a range of creative practitioners, focused around crafting and interacting with prehistoric archaeological artifacts from peatlands (image on previous page).

We can encourage people to experience the act of making, to touch the replicas of prehistoric artifacts that can only otherwise be experienced from behind a case in a museum or a picture in a book.



Above: Dawn Landscape Killaun. © Tina Claffey. All rights reserved.

“I am an award winning nature photographer and author of ‘Tapestry of Light-Ireland’s bogs & wetlands as never seen before’ released in October 2017.

For almost 10 years, I lived and worked in pristine wilderness areas in Botswana, and this experience awakened an appreciation of the natural world of Ireland.

My observations and unique perspective of the flora and fauna of the unspoilt raised bogs and wet woodlands of the Irish midlands are celebrated in my work.”

-Tina Claffey

Find out more on tinaclaffey.com



Above: Heather landscape Abbeyleix - the location of a peatland undergoing ‘rehabilitation’. © Tina Claffey. All rights reserved.

Through future projects, how do you envision working with communities and artists in Ireland?

As well as drawing attention to the importance of peatlands for archaeological heritage, one of our main aims is to get people out onto peatlands and engage them on a sensory level - the sights, the sounds, the smells - that make working in these environments so enjoyable and unique. Stand in your welly boots on a bog; and it is an experience like no other (even more so if you fall into it!).. and we want people to appreciate that!

Whilst recent years have seen increased realization of the importance of healthy peatlands for biodiversity, carbon storage and other 'ecosystem services', the recognition of the value of peatlands as 'archives' has lagged behind. The importance of this is heightened, as many sites and artifacts have been lost to peat cutting; it has been estimated that thousands of sites have been destroyed in the UK, Ireland and other European countries. We are also collaborating with the [Glucksman Gallery](#), Cork on an artistic commission that will form part of future educational programmes around peatlands and the environment.

We engage directly with the community, working with local groups that have the knowledge, contacts and enthusiasm that drives grass-roots interest in peatlands.

In Ireland, we have a formal partnership with the [Community Wetlands Forum](#), an incredible organization with the promotion of peatland rehabilitation as their unifying ethos.

We collaborate through heritage days with talks and practical opportunities to get people involved, This summer (the present global situation permitting!) will be working with artists and experimental archaeologists on a number of projects based at different peatlands in Ireland, taking samples of peat to examine the pollen grains that are preserved and tell the history of the landscape, building replica prehistoric trackways using experimental archaeological approaches.

But this is not just about us throwing information out to tell people what they should value. We want to know what different communities think; if and how they would like to be more involved, what their perceptions of different values are.

How can we better target our research, in a useful and engaging way?

WetFutures is about exploring the 'how, why and what' about public opinion on heritage and its complex relationship with other social and cultural questions and issues.

Final thoughts

The WetFutures project unites diverse communities who are working to preserve peatlands in Ireland for their environmental and cultural value. Due to their low oxygen conditions, peatlands preserve archaeological specimens like the Iron Age timber trackway that Benjamin Gearey shared in an image. We can see how these environments are 'archives' of natural history and heritage.

Bio

WetFutures is a group of European archaeologists, geographers and social scientists, based across Ireland, UK and the Netherlands; with a collective interest in the protection, promotion and engagement of all things related to wetland heritage.

Answers by Dr Benjamin Gearey, Rosie Everett (University College Cork, Ireland) and Dr Kim Davies (Bournemouth University). WetFutures (Ireland) is funded by the Heritage Council via The JPICH Heritage in Changing Environments Scheme.

Links

[Website](#)

Twitter:
[@wetfutures](#)

Plastic pollution awareness in the classroom

Phil Humphreys is a geography teacher who is raising awareness of plastic pollution to not only his pupils, but the wider community as well, through the 'eco-brick' project. Here, Phil shares what inspired the initiative and the impact it has had.



Above: 'Ecobricks' created in the classroom.
© Phil Humphreys. All rights reserved.

Thoughts - Phil Humphreys

Inspired to teach

I have always wanted to teach. My father was a teacher, and I think that, that influenced me. I remember going in to school with him when I was ill, or going occasionally to pick him up, and thinking that it was all pretty cool. It still is to be fair! I was heavily inspired towards geography teaching, by an inspirational teacher I had in my Sixth Form, Mr Henbest. He marked nothing, radical for today's standards, but the passion he brought to the lessons and to geography in particular has stayed with me. The humour and care he displayed to each one of us in the class meant in the end, that we all did really well. I think that this fostered my enthusiasm. I have not wanted to do anything else, and to be honest I have never done anything else either!

Raising conservation issues in class

I think there has been no better time to be a Geography Teacher. To be able to influence the future generations, at this time especially, when surrounded by a constant stream of geographical news - pollution, climate emergence, pandemics, and help them make sense of everything, is a real privilege. These are themes that are a constant thread in everything I do, but conservation especially is taught integrally through units of work on plastic, fast fashion (cotton and water), and coffee trade along with land conservation.

I like to think that I am educating the next wave of radical geographers, students who are prepared to stand up and make a difference. The pupils here at school really care. It is my job to help them steer a path through the noise.

Inspiration for 'ecobricks'

I was listening to Radio 5 before Christmas, and a report came on about the amount of waste that is generated over Christmas, much of which cannot be recycled. Combine that with the number of fizzy drinks bottles that exist (again, particularly around the festive season), and you have the perfect recipe for ecobricks! I ran an assembly, and the interest was sparked. We have had 97 ecobricks completed so far, meaning nearly 6kg of single use plastic has been taken out the environment.

Impact on community

The impact has been phenomenal and totally unexpected. We have had ecobricks in from parents, their work places, governors, staff, and more! After an appearance on Radio Oxford, we managed to find a home for them too. They are going to a local community initiative to help them build sustainable enclosures for their wildlife. It seems that the pupils here at school will have the opportunity to help build with the bricks too, which will be brilliant.



Philip Humphreys is Head of Geography at Wychwood School in the center of Oxford. Find out more at [@wychwoodgeog](https://www.wychwoodgeog.org) or contact Phil on p.humphreys@wychwoodschoo.org

Why the push to stop wildlife consumption isn't about wildlife

By Jazmin “Sunny” Murphy

The coronavirus pandemic has revitalized a debate that has plagued the global wildlife community for decades. Headlines urging entire nations and people groups to cease their consumption of wildlife are congesting news columns and wildlife journals everywhere, as research has now given credibility to the idea that the consumption of a bat is what jumpstarted the spread of the novel virus, Covid-19.

Despite the ignition of this discussion's reawakening, I suspect that these arguments in support of a ban on wildlife consumption aren't about wildlife at all. One thing that has always been a distinguishing characteristic of cultures across the globe is cuisine. While Westerners shy away from dining on most invertebrates, many Eastern cultures view them as a delicacy, even a staple of the daily diet. Still, there are similarities to be drawn between these divides. Americans who grew up in Arizona, for example, will likely pay little attention to someone munching away at a scorpion. Sure, it may merit some Instagram pics and a giggle or two, but it's not unheard of.

So why, then, does this same demographic recoil in disgust when a Cambodian, Laotian, or a Vietnamese person enjoys a mealworm or two?

Surely, we are not concerned about the wellbeing of the mealworm in these scenarios?

If we were, why wouldn't we share the same sentiment for the poor scorpion?

What value does the mealworm hold that the scorpion does not?

Truthfully, there is no difference. At least, not in the bugs.

Americans eat all kinds of things. Apart from the standard beef and chicken that most of us enjoy, many hunters boast about having beheaded a rattlesnake whose meat they have stashed in a

freezer for a hearty meal. Southerners share a common disdain for a dish that few of us understand the reason for its persistence: chitterlings, AKA “chitlins” (pig intestines). Although it's not widely loved, it is still considered a staple of the African American subculture in the States. Frog legs, alligator, armadillos – the list of non-domesticated animals consumed in the U.S. goes on.

So, why this hostility toward cultures who eat wildlife native to their home country?

To many, the explanation is rather simple: xenophobia.

“..research has now given credibility to the idea that the consumption of a bat is what jumpstarted the spread of the novel virus, Covid-19”



Westerners are blissfully unaware of the drivers behind the prevalence of bushmeat consumption in countries of both the Global South and the Global North. Impoverished communities are faced with crushing socioeconomic divides that practically force them into the wilderness to hunt species most Westerners would consider “exotic” (and therefore more worthy of legislative protections) such African lions, for example.

These same political and societal pressures are behind wildlife trafficking as well – for many, these are the only methods by which they can make a living to support their families in the volatile political climates plaguing their homelands.

Apart from these issues, the matter comes down to the simplest factor of them all: preference.

There was a notable absence of worldwide calls to stop U.S. citizens from consuming pigs when the Swine Flu reared its ugly head.

Few are calling for the cessation of rattlesnake consumption, though many subspecies are facing declines. Western life revolves around the idea that we can sit on our judgmental butts and tell everyone else to acclimate to our way of thinking.

This time, it’s clear that we care little for the welfare of the animals, or even the phylogeny of the virus, at that. This time is just like any other time.

We’ve manipulated current events to fit our agenda: To force everyone to assimilate to the comforts of American ideology.

Bio

Jazmin “Sunny” Murphy is the Creator and head writer of Black Flower Science Co. - a platform meant to facilitate the building of relationships while challenging social stigmas attached to cannabis use.

You can support Jazmin’s work by visiting blackflowerscience.co and purchasing a book or offering a donation, or by becoming a patron at patreon.com/BlackFloSciCo

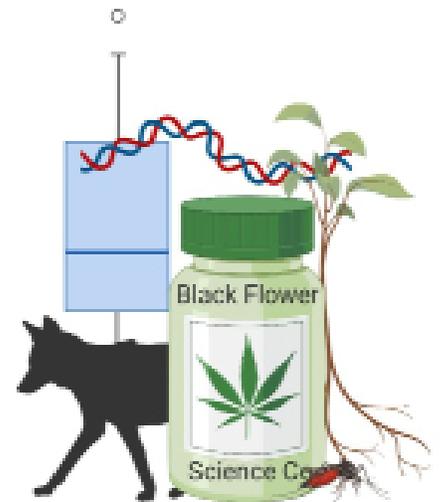
Black Flower Science Co. weed and science

representation for the
BIPOC
and
neurodivergent

watch more videos,
read some articles,
learn more stuff
at blackflowerscience.co

#smokeandlearn

Twitter: [@highscicom](https://twitter.com/highscicom)
Instagram: [@highscicom](https://www.instagram.com/highscicom)



Above: Black Flower Science Co. information. © Black Flower Science Co. All rights reserved.

Addressing wildlife conflicts is about attitude

By **Tim Snow**
 (Director of Wildlife Poisoning Prevention and Conflict Resolution)

Systems thinking simply means analysis and review of cause and effect of the problem and the management response, to ensure responses were efficient, effective, appropriate environmentally and financially; and achieved appropriate results. The manner of addressing problem is influenced by attitude to success or failure with odds at fifty-fifty.

Emotion, misunderstanding and exaggeration can influence attitude and perceptions, making it critical to remain logical for the outcome to be successful. Probably the greatest failure in management is failure to accept and acknowledge facts and respond accordingly.



Above: Wildlife Poisoning Prevention Conflict Resolution logo.
 © Wildlife Poisoning Prevention Conflict Resolution.
 All rights reserved.

Doing nothing is also a management decision, but has to be appropriate and not just a case of ignoring a problem. Doing the same thing repeatedly cannot be expected to achieve different results.

Good management demands awareness, knowledge and analysis of facts. Many only respond to a crisis. The most elegant form of managerial decisions involves problems that never have to be solved because they are prevented from occurring, because they are anticipated and avoided. Yet, there is often appreciation for the manager who can step in and counter the problem after it happens than one who can make it not happen. Coping with crisis is dramatic. Prevention is unpopular, because it usually means change. It is thankless, because the only testimony of its effectiveness is a non-event.

Even so, a deliberate non-catastrophe is one of the most impressive contributions a manager can make. Wildlife conflict resolution seems logical, but it is not always simple. The solution may be obvious, yet so prohibitively expensive as to be impossible. A rural African village enclosing their croplands with a cable

fence to exclude elephants is not impossible but it's not likely because of prohibitive cost. It's more likely that they would dig a trench, build a barricade, plant chilli bushes as a repellent around the crops, or make chilli-sisal rope fences or combustible chilli bricks.

Some conflict managers suggest paintball guns, but how many villagers have this luxury?

The TV programme Survivor, uses the strapline "outwit, outplay, outlast". What is most important in managing conflict is a determined attitude. Elephants and bees don't get along, so bee hives may help, provided they are raised above the ground and are connected to be disturbed by raiding elephants, because otherwise the beehives could attract honey badgers – a secondary conflict! Consider also the risk to villagers. Ethiopian farmers use a "push-pull" method to inter-crop cotton and maize.

Bollworms are a pest common to both crops, but favour the maize which means the cotton is spared and the maize sacrificed. Vegetable growers also plant African marigolds to deter insects and snails.

Natural animal breeding is synchronised within a season when food is plentiful and the survival chances for the young are greatest. This process gives the young safety in numbers and enhances survival, because the number of survivors exceeds predation.

In the livestock farming arena one has to think laterally about enabling greater safety for calving or lambing animals by protection. In the case of dairies and expensive livestock, it makes sense to build predator exclusion fences, because the value of certain animals justifies the expense of protection.

Animals are vulnerable in thick vegetation and in long grass after good rains, and some farmers distribute day old chicks around the farm during calving or lambing to reduce predator hunger and minimise impact on the calf crop. Feeding with condemned carcasses from the local abattoir is another option for creating a diversion, but these methods can only reduce or minimise losses; and may unnaturally support unwanted predators. By feeding predators, the farmer may be picking the cane for his own back. Many factors make every situation slightly different and what works for one may not work for another; and after all is said and done, predators also have to eat. These are not the only conflicts with wildlife.

Naughty monkeys and baboons seem to make mischief everywhere, but when one thinks this issue through carefully and applies the systems thinking process to identify the cause of the problem it becomes clear that bad waste management by humans is often the cause of the conflict. Primates learn that humans are wasteful, so a daily visit to the waste disposal may get them a meal and save hours of foraging.

They become bolder and more brazen, because their negative behaviour results in a positive reward. The solution is waste management. Reduce, re-use and recycle. It is about human attitude.

“Seeing the potential problem and preventing it from happening is a very valuable management process.”

Often the problem becomes severe before municipal and lodge managers will take steps by pro-active planning and management. Seeing the potential problem and preventing it from happening is a very valuable management process.

A monkey that threatens human children for food soon realises the small humans scream, drop the food and run away. Just like dustbin raiding, the negative encounter produces a positive reward for the monkey, and results in repetition. Monkeys raid homes for easy food, because humans “forage” at supermarkets and display fruit bowls on accessible tables.

The solution is mesh screens on windows, and simply just storing food out of sight. Monkeys are ultra-intelligent thieves, with time to wait for humans to drop their guard. This problem can’t be underplayed or oversimplified and there is so much more to this issue than can be covered by this short overview.

One may conclude that many wildlife conflict situations are caused by humans and their activities.

Proper planning and management, coupled with clear and logical systems thinking can lead to a paradigm turnabout of wildlife conflict where the “problem” becomes redefined.

Bio

Tim Snow is a well qualified consultant in wildlife poisoning prevention, wildlife conflict and wildlife management and has over 40 years of field experience in Africa.

Find out more on [Facebook](#) or visit wildlifepoisoningprevention.co.za

Scicomm

(Science

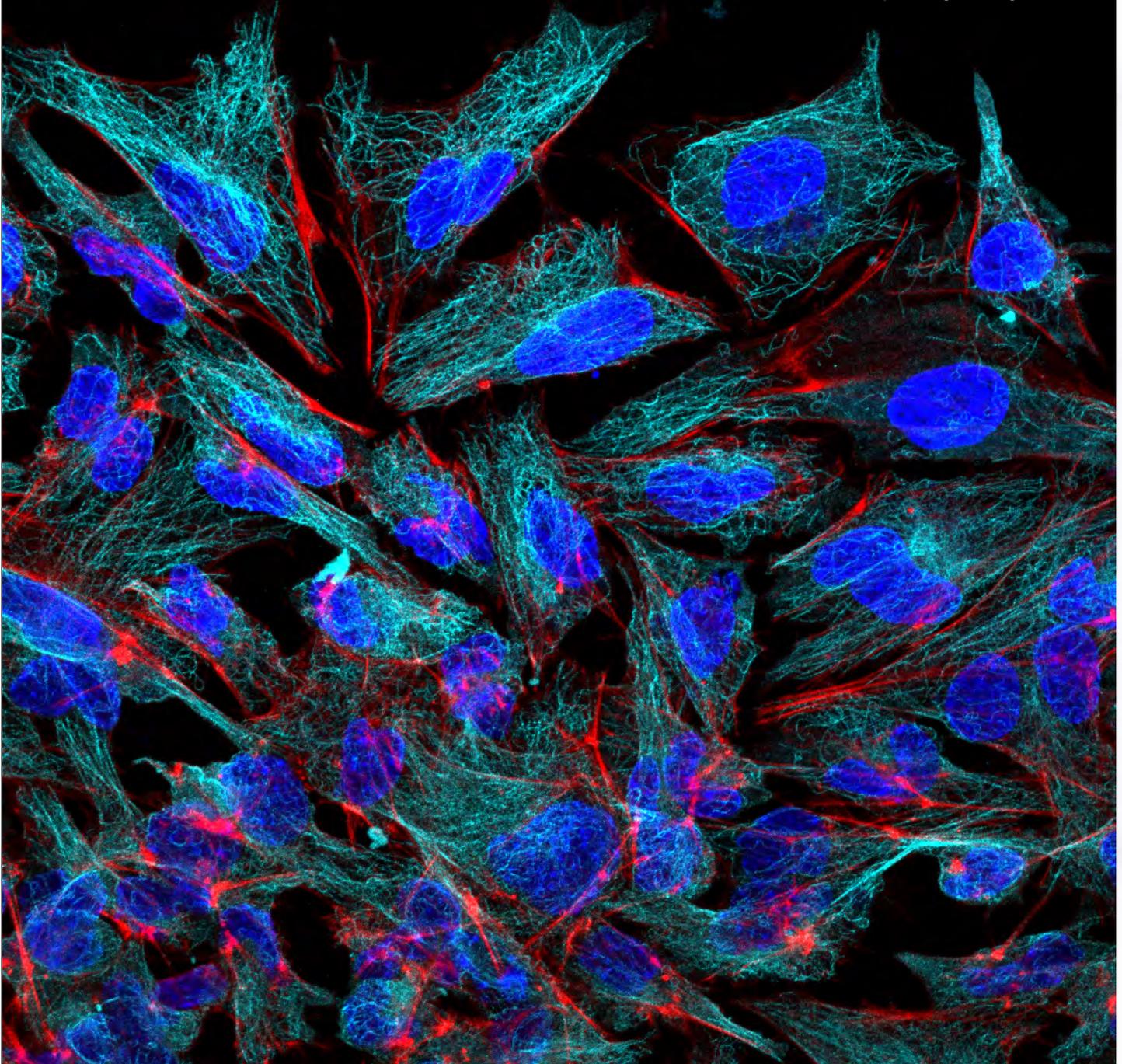
communication)



Making SciArt with make-up

Make-up may seem a world apart from the scientific sphere, but two academics, Chiara Di Ponzio and Francesca Mircola, show this can be just another way to learn through their artistic science communication project, Microscope Me Up. Inspired by research in cell biology, interesting biological facts are conveyed with the vibrant colors painted by make-up artists.

Below: Mouse stem cells stained for cytoskeletal proteins - acquired by Sophie Morgani (Sloan Kettering Institute, USA & Wellcome-MRC Cambridge Stem Cell Institute, UK). © Sophie Morgani. All rights reserved.



Q & A - Chiara Di Ponzio & Francesca Mircola

Please tell us about your different backgrounds and what brought you together to start *Microscope me up*?

Francesca: We have known each other for a very long time, we attended high school together in our hometown, Taranto. Then I studied in Pavia for my master's in biotechnology and Chiara studied in Rome for her master's in biomedical engineering. Now we have swapped: I am working on my PhD in engineering, while Chiara is about to achieve her PhD in biology. We have been great friends for the last 15 years, and we share a big passion for make-up and science. That's what brought us together in this project: we wanted to bridge these two worlds to show the beauty of science to everyone.

How do you use the artistic aesthetics of make up to communicate scientific concepts?

Chiara: Science has a huge weight on our life, but often scientists don't consider the importance of scientific communication. It can be really hard to understand science, but microscopy allows the visualization of many different complex systems. It is a mesmerizing world of shapes, patterns and colors that can inspire any creative mind. Make-up, on the other hand, is a form of art and any face, or body, can be the perfect canvas to portray the beauty of the microscopic world. But to achieve our ultimate goal, merging these two worlds visually in a post is not enough: as scientists we try to explain scientific concepts behind the microscopy image and give everyone the chance to understand science a little more.

Please describe some examples of your works, and explain what they show.

In the images shown, we show an example of our format. We collaborate with scientists who provide us with microscopy images from their research.

Then, we propose these images to make-up artists whose work we particularly like and we ask them to create a microscopy inspired make-up look in their own style.

Finally, we post the two images together and shortly explain the scientific content.



Right: Make-up look created by Raluca Elena Mirea (IG: @rryuukm) inspired by the stem cell image on the previous page.
© Raluca Elena Mirea. All rights reserved.

As shown in the first image of this article, Sophie Morgani imaged stem cells derived from mouse models and stained (colored) them to highlight the cytoskeleton proteins.

The image on the previous page shows Raluca Elena Mirea's make-up look inspired by Morgani's image. The Microscope me up logo (shown below), represents the philosophy of mixing microscopy and make-up in a creative way.

What are you hoping to achieve next in your project? Are exhibitions a possibility?

Francesca & Chiara: The reason why we created this page is to make science accessible to everyone, no matter the age, the gender, or the background. So, our next goal is to expand our community and include as many people as possible.

We appreciate many other sci-artists so one of our next steps will be to collaborate with some of them

to organize exhibitions or sci-art events. In this perspective, we think such events should use the potential of social media as the perfect virtual space.

In fact, we are currently working on another initiative on our Instagram page: creating a new style of "scientific conference" to open the science community to make-up and the artistic side of science. An exemplary session works this way: a scientist explains her/his findings while a make-up artist creates a look during the time of the talk.

We have gladly realised that our community is highly interested in these live sessions because they can ask scientists any question and get a direct answer from experts. In future, we plan to collaborate with make-up artists to bring science outreach to make-up and fashion events.

Finally, we would like to establish new collaborations with make-up and microscopy related brands - possibly combining them.

Final thoughts



Above: © Microscope Me Up logo. All rights reserved.

Through their project Microscope Me Up, Chiara and Francesca bring together make-up artists and scientists to create vibrant and unique SciArt; bringing the arts to the sciences, but also the sciences to the arts. In the future, they are open to new collaborations and to grow into new domains, such as science outreach in the fashion industry. So, if you have interesting cell biology insights to share, or a talent for make-up artistry, don't hesitate get in touch with them to find it out more!

Bio

Chiara Di Ponzio

I am a biomedical engineer by education, with a focus on cancer bioinformatics. I switched to biology for my PhD and I am now working on systems biology in pancreatic cancer in Heidelberg, Germany. I am passionate about make-up and movies and I advocate for rights of minorities in science.

Francesca Miricola

I am a pharmaceutical biotechnologist, experienced in cosmetic formulation. I recently started my PhD project in the personal care industry in Liverpool, UK. Make-up has always been one of my biggest passions, along with singing. I am also involved in volunteering activities to improve social equality.

Links

Instagram:

[@microscope_meup](https://www.instagram.com/microscope_meup)

Twitter:

[@MeMicroscope](https://twitter.com/MeMicroscope)

Facebook:

[Microscope me up](https://www.facebook.com/microscope.me.up)

Email:

microscopemeup@gmail.com

Accessing ancient artifacts with 3D scanners

Visiting a museum can be more engaging than reading a textbook, as many of us will agree. Seeing an artifact in front of our eyes can be more memorable, and ‘feel more real’ than a flat 2D image.

Many museums create replicas to reduce harm to original specimens, but methods of creation can be timely and environmentally harmful.

Kylie Dillinger is an anthropologist who uses 3D scanning and printing technologies to create archaeological replicas of ancient artifacts in an efficient and sustainable way.

Helping to bring the past back to life, these replicas can be felt in our hands, and observed in ways that aren’t possible with the original specimens, that could even be too fragile to be displayed.



Above: A 3D printed reconstruction of a teacup from the Amache Japanese Internment Camp in Granada, CO.
© Carlene Tinker. All Rights Reserved.

Below: Artifacts Interactive Artifact Display Case
© Kylie Dillinger All Rights Reserved.



Q & A - Kylie Dillinger

How do you use 3D scanning and printing technologies to communicate your field of science?

I use 3D scanning and printing technologies to communicate information in a more tangible and accessible way. It's one thing to read on a piece of paper what the purpose and function of an artifact was and to see it in front of you, but it's an entirely different feeling to actually hold the artifact in your hands and be able to pantomime the usage, or feel the weight and thickness and different textures also associated with the piece. Using 3D scanning and printing technologies, I like to try and communicate that physical type of learning and knowledge that normally only trained professionals get to experience through much less fragile replicas. The 3D scans are also still available to see digitally as a .stl or .obj file for academic purposes or, in the case of the Smithsonian launching so many of its collections online on Sketchfab, for viewers who might not be able to go to the museums and see these artifacts in person.

What advantage do these techniques offer over traditionally used methods in anthropology and archaeology?

The 3D scanning technology offers a more minimally invasive way to recreate artifacts, and an easier way to share them online with other researchers. Doing a mold and recreating an artifact that way wears down on a piece over time, and photogrammetry is honestly just a lot more time-consuming with the need to constantly re-set a physical camera and get all the angles to accomplish the task just right. 3D scanning, on the other hand,

is like photogrammetry, but with the camera doing the work putting everything in a spacial area for you instead of having to take the different photos at different angles. There has also been work in 3D scanning archaeological sites, which has the opportunity to better track site degradation over time due to the elements and any other exterior influences and also offer ways to digitally show other researchers what a specific site looks like and give more comprehensive spatial data as to how different features may associate with each other.

It's one thing to look at pictures and maps, but another thing to be able to walk through the site on a computer and be able to experience and compare data in that format. 3D printing has the advantage of the replicas being able to be made fairly quickly and actually somewhat environmentally-friendly depending on what type of thermoplastic is used (PLA is biodegradable), and the replicas are also extremely durable and difficult to break on accident.

Please refer to a few examples of your 3D print replicas and discuss what these pieces represent archaeologically.

I've 3D scanned and printed a few different artifacts from all around the world. One of my favorite things that I've done though that I believe can help with better understanding use/form/function/purpose of an artifact though is digitally rebuild pottery from collected sherds. I did this with two different pieces from the Amache Japanese Internment Camp in Granada, CO - a bowl and a teacup - during Dr. Bonnie Clark's field school at the site, and the reconstructions offered a more visual and easier to conceptualize version for researchers and public alike as to what those artifacts would have looked like in their original form and time of use. I did a similar thing on a project for the Archaeological Method & Theory class taught by Dr. Lawrence Conyers at the University of Denver, and did partial reconstructions on pottery sherds were were examining so that we could better understand what types of pottery (platters, bowls,



Left: Display of artifact replicas for Artifacts Interactive exhibit.
© Kylie Dillinger All Rights Reserved.

ollas, etc.) were found between two different sites and better compare what sorts of activities were going on in the two different areas. I didn't print these, I just did the 3D scans and shared the digital reconstruction photos because they were only partial reconstructions and not full ones.

These models could be considered a fairly new medium for museum exhibits. How have you displayed your 3D replicas to the public and what was the response?

The 3D printed pieces for the Amache Japanese Internment Camp are actually still with a travelling exhibit of the site currently, however with Dr. Clark's permission during the field school I also printed extra replicas of the teacup for each former internee or internee descendant to the Amache site that volunteered during that field season. Everyone was really happy to be able to take a piece of history home with them, even in a digitally replicated and printed form, and it personally made me feel proud to be able to do something to give back to the amazing volunteers that were able to share their stories with myself and other students.

I also recently had a museum display on campus at the University of Denver as a part of my senior capstone project to earn my bachelors' degree, entitled Artifacts Interactive.

The way I set up the display was that I had a selection of the original artifacts I had 3D scanned and printed on display safely behind glass, with a label to state what the object was and where it came from along with different types of themes I wanted to get across like accessibility and the idea of open-source archaeology.

Bio

My name is Kylie Dillinger. I'm a recent graduate from the University of Denver with a Bachelor's Degree in Anthropology, and I minor in Emergent Digital Practices.

I'm extremely passionate about merging 3D digital technologies and archaeology together to create a more easily accessible form of public archaeology, as well as to encourage and help build a form of open-source archaeology for the future.

Right: Partial Reconstruction of a hypothesized water jug based on a sherd from the Archaeological Method & Theory class.
© Kylie Dillinger.
All Rights Reserved.



From there, directly to the right of the original artifacts was a small pedestal with the matching 3D printed replicas set up in the same positions as the originals behind glass. The replicas weren't tied down or bound to the pedestal in any way, all I put up was a sign explaining that the replicas were to be interacted with and requesting very nicely for nobody to walk away with them. I never once had to replace a stolen 3D printed replica, which I think speaks highly not only as to how people enjoyed the exhibit, but also that viewers wanted to make sure others enjoyed it as well. I took survey data on viewer experiences and the overall consensus was that the majority of people who interacted with this form of tangible display enjoyed it over the traditional "look, don't touch" setup in most museums.

Final thoughts

Creating 3D printed replicas of archaeological artifacts benefits public outreach by bringing research to wider audiences, the environment by using less harmful substances than other recreation methods, and research by saving time compared to more repetitive approaches. Kylie Dillinger utilized 3D digital technologies to harness these advantages, and bring the past to life for more people, in exhibits and online.

Links

Website:
3d-scanning-archaeology.com

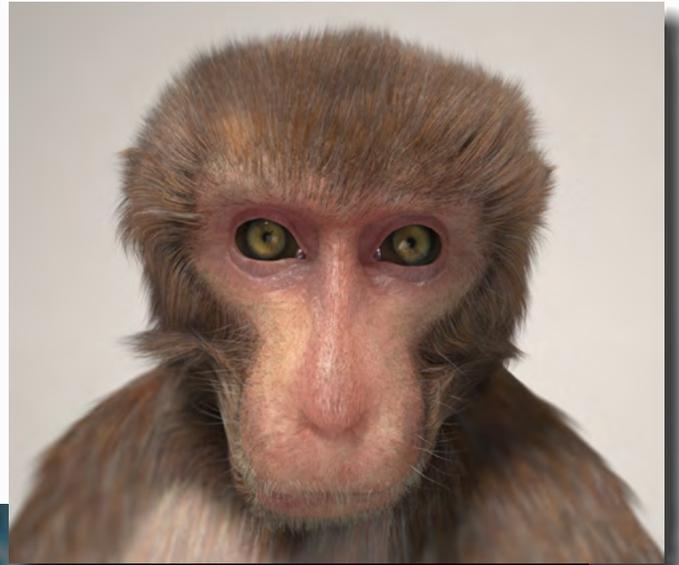
Email:
3dscanningarchaeology@gmail.com

Creating hyper-realistic neuroscience illustrations

Neuroscience can be a complex subject to comprehend and convey to wider audiences.

Kelly Bullock takes her fascination for nature and the human brain to communicate neuroscience through her artwork. Seeing a communication gap between science and the public, she founded a scientific communication studio called Kelly Bullock Art.

She tells us about the story of how it began, what inspired the venture into scientific illustration, along with some techniques used to achieve vivid results.



Top right: Macaque Monkey - The challenge was to create three photorealistic 3D monkey avatars for use as a visual asset in a virtual environment. The character was modeled using reference pictures from the PrimFace Visiome and medical images from the Kyoto Digital Morphology Museum and fine detail was sculpted. Model was textured using roughness, diffuse, and normal maps, and given subsurface scatter. Finally, fur was added, coloured, and styled. © Kelly Bullock. All Rights Reserved.

Directly above: Neuron - This artwork was created as wall art for researchers to display to promote an appreciation of the beauty of the neuronal landscape at the cellular level. © Kelly Bullock. All Rights Reserved.

Q & A - Kelly Bullock

How did you become involved in science and then start Kelly Bullock Art?

I have been fascinated since a young age by nature and drawn to understanding how the human brain works. My grandmother was a big reader and gave me a few neuroscience and psychology books, and from there I was hooked. I decided to pursue graduate studies in neuroscience after university, and soon found that research was not the best fit for my skills and interests. My passion lied in the communication of science.

Having practiced drawing from a young age, I had not initially considered making a career in a creative field. Like so many other scientific illustrators, when I was introduced to the concept of combining my design skills with my understanding of science, it was a revelation. I felt that there was a critical gap in understanding between the policy makers and public, and the scientists conducting the research. I decided to start a scientific illustration studio to address that communications gap.

The field of scientific and medical illustration is so vast and varied, and it feels like living on the cutting edge of science, art, and technology. That's an exciting place to be.

Your 'sliced brain' image presents a unique way of showing the brain. Did you take on this concept for scientific or artistic reasons?

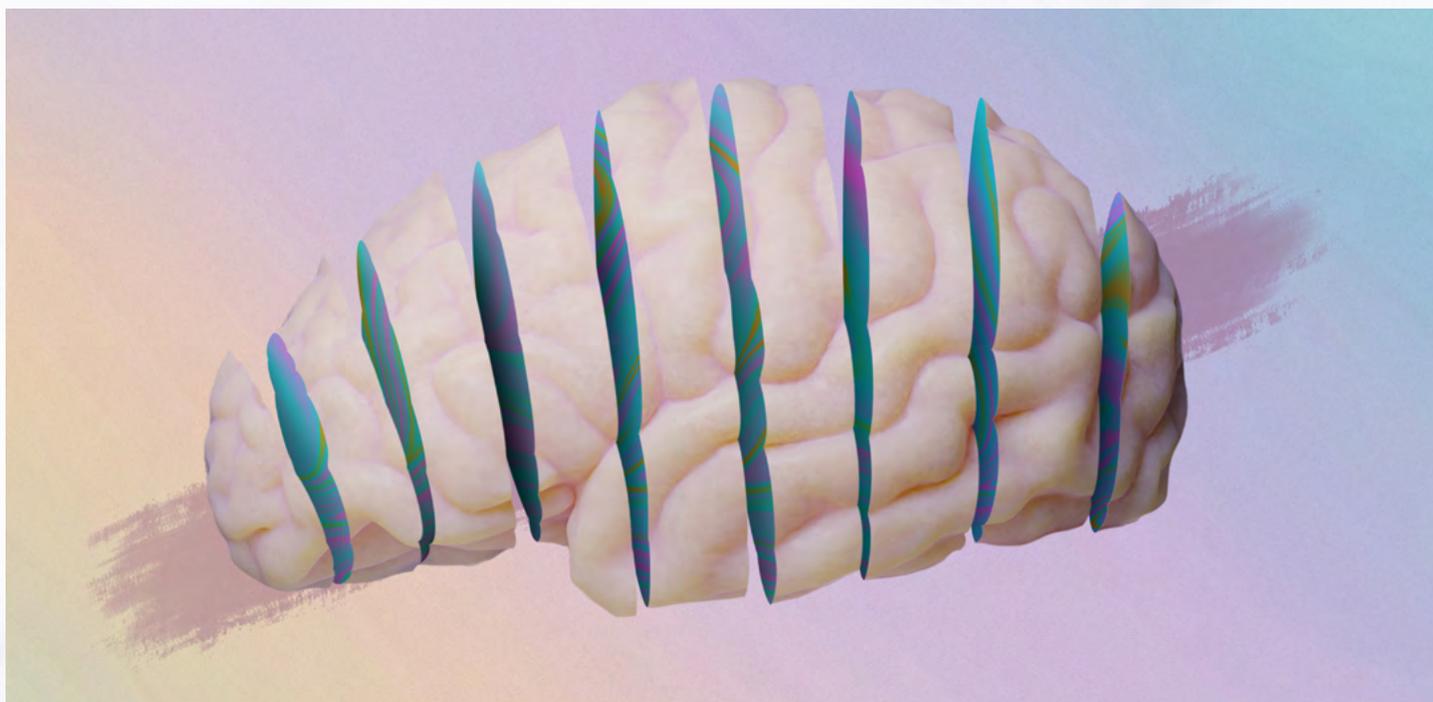
The inspiration for this piece was an artistic take on a technique for studying the brain; slicing or 'sectioning' the brain. This was conceived as a fine art piece created to explore the process of understanding the form and function of the brain through de-construction into its basic parts. It comments on the gestalt principle in which the whole construct is different, more, than its constituent parts.

We'd love to see your other forms of art relating to neuroscience and psychology..

I aim to capture the world of science visually in a way that many may not have seen before. For instance, a lot of cell imaging techniques show cells in 2 dimensions. I wanted to highlight the 3-dimensional form of the neuron with realistic materials in the Pyramidal Neuron piece.

I also love creating 3D content for virtual environments, such as the monkey avatar, which will be used in experiments. I believe in the power of visuals to help connect with the audience on an intuitive level.

Below: Sliced – Fine art piece created to explore the process of understanding the form and function of the brain through de-construction into its basic parts.
© Kelly Bullock. All Rights Reserved.



How did you create the rat brain model, as shown in a video on your site?

The rat brain (see image to the right) was modelled and sculpted by hand in Blender 3D using the Waxholm Rat from the Scalable Brain Atlas and the Comparative Mammalian Brain Collections for reference.

Photorealism can be achieved in Blender with the physically-based path tracing Cycles render engine, and physically based materials. The Filmic color space allows for photorealistic renders with a high dynamic range.

Adding just the right amount of sub-surface scattering and imperfect gloss to the surface gives it that squishy, organic look.



Above: Rat Brain - A photorealistic 3D model of the rat brain for education and reference of external anatomy. Brain was sculpted and textured in Blender referencing the Scalable Brain Atlas to ensure anatomical accuracy. © Kelly Bullock. All Rights Reserved.

Final thoughts

Scientific illustrator Kelly Bullock suggests that illustrating neuroscience concepts in 3D could be more effective than in 2D. It is particularly striking to see the intricacy of the neuron and the complexity of its surrounding network by adding an extra visual dimension.

We can see how an extra vividness can also be achieved through the artistic software techniques Kelly Bullock has shared, that give these graphics a soft, 'squishy', organic feel.

Bio

Kelly Bullock earned her MSc in neurophysiology from McGill University in Canada.

During her research, she noticed a gap between the scientists and the diverse audiences they served.

Kelly has applied her enthusiasm for hyper-realistic drawing to creating accurate depictions of the natural world. She currently runs a studio - Kelly Bullock Art - inspired to address this communication gap.

Links

[Website](#)

Twitter: [@BullockArt](#)

[LinkedIn](#)

Instagram: [@kelly.bullock.art](#)

Email: kelly@kellybullockart.com

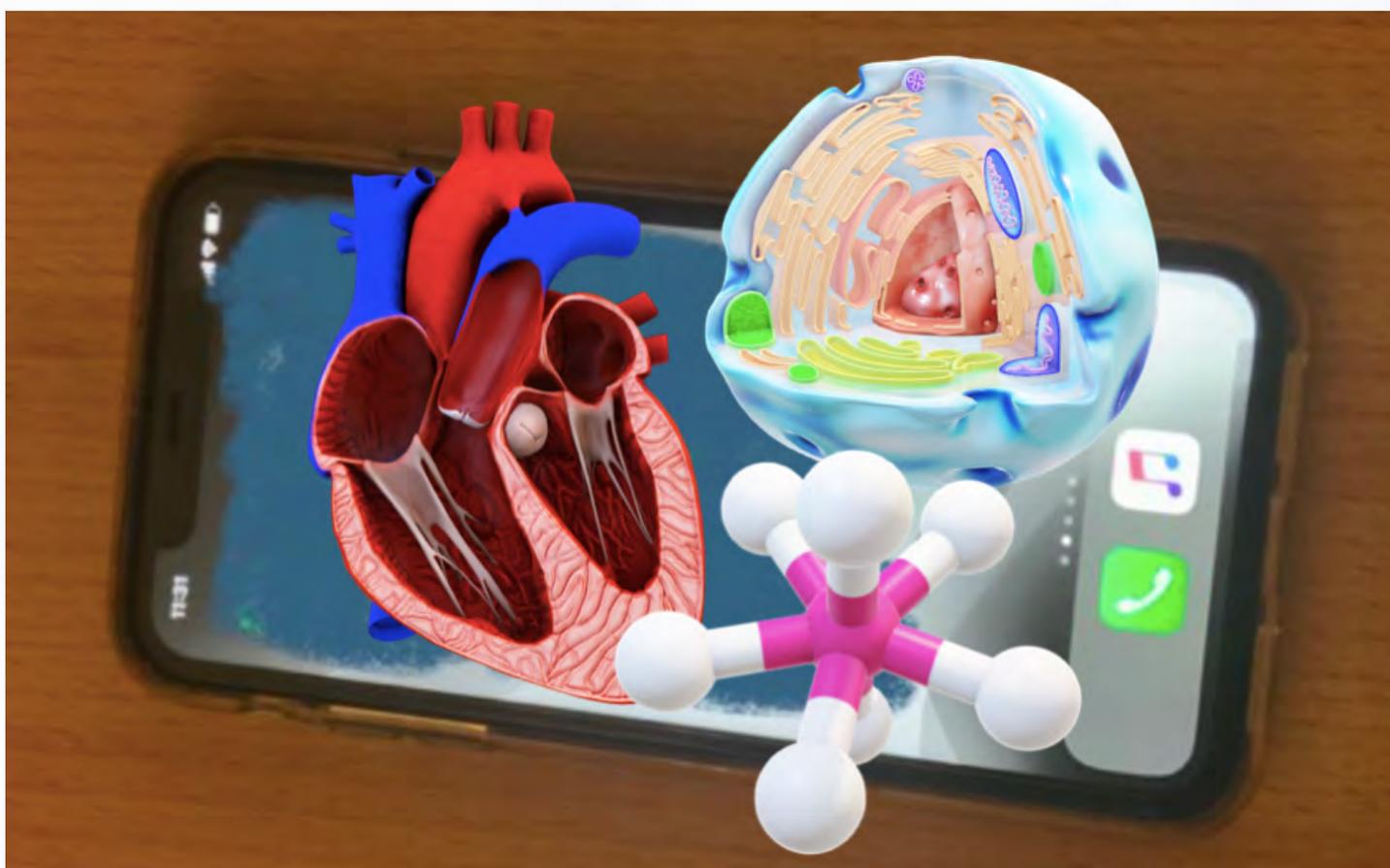
Designing virtual tools to teach science post-pandemic

Virtual learning has provided a lifeline for educational programs during the worldwide lockdowns of the coronavirus pandemic, as students and teachers took to home-learning.

Mojgan Matloob is a physics and astronomy educator who believes digital educational tools will become even more important in the post-pandemic world.

New, educational methods of teaching physics concepts are developed via cyberlearning and augmented reality.

Generating applications from a science lab, Mojgan not only aims to digitize information, but help students learn and memorize complex notions through the power of imagery.



Directly above: Using AR to add dimensions to the books.

Graphics re-used and reproduced from Microsoft 365 using 3D Remix. © Mojgan Matloob. All rights reserved.

Q & A - Mojgan Matloob

Please tell us about your background and current visualization interests in physics.

I am a physics and astronomy educator, and my previous experience involved teaching and research in physics education at undergraduate level. I hold a doctorate from Kansas State University and have explored the probabilities of students' patterns of scientific reasoning based on the predictors that were parameters of instruction. I have been a faculty since 2011, teaching physics and astronomy and have also collaborated with learning centers as an educational designer to revamp science courses, to develop assessment tools, asynchronous online courses with features such as simulations, assessments with adaptive pace, interactive games, and engaging tutorials.

My other contribution to distant learning was through a collaboration between Carnegie Mellon and Kansas state university to develop an automated response system to answers teachers' questions about teaching physics. I was a recipient of the CHEVENING award in 2002 for studying at the University of Glasgow, which I explored students' difficulties in geometrical astronomy with an outcome of a self-diagnostic online assessment tool.

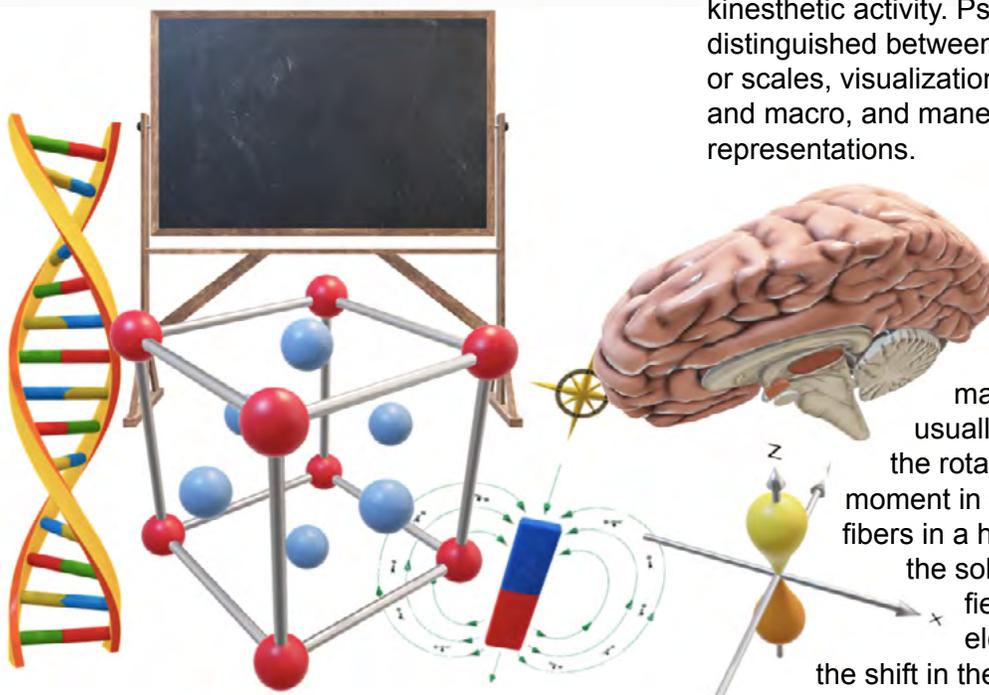
Currently, I am developing augmented reality science labs to facilitate spatial processing and enhancing students' conceptual structure. My collaborators and I are leveraging on the extended field of view of AR, our designs create opportunities for in-depth learning, such as comparing processes of biochemical reactions, physics interactions, or connecting QM representations to experimentations.

We will create digital assets such as sensor-based light-triggered bio-reactions to generate AR 3D electron microscope imagery, replicating bulky laser experimentation, three-dimensional visualization of geometrical concepts.

How do you help students learn abstract concepts through cyberlearning and augmented reality?

Learning about sciences involves the mental visualization of dynamic processes, which generates mental animation. A growing body of research in psychometrics and science education literature has reported the high correlation between learners' spatial abilities and success in the sciences. Scientists referred to various tools of visualization such as pattern-seeking, eliminating unnecessary details, physical modeling or three-dimensional visualization, learning by analogy, learning by sketching, or kinesthetic activity. Psychometric scientists have distinguished between spatial abilities of various time or scales, visualization and connecting the micro and macro, and maneuvering between different representations.

Often, scientists use demonstrations and experiments to enhance visualization. For example, the dipole moment is a purely mathematical concept. Students usually have difficulty to visualize the rotation and polarization of dipole moment in an electric field. I used carbon fibers in a hydrophobic Solution and placed the solution in a 5000 v/m electric field. By turning on and off the electric field, students observed the shift in the orientation of the laser beam passing through the solution and a pure mathematical rotation became visible.



Directly above: Bringing digital objects to the classroom. Graphics re-used and reproduced from Microsoft 365 using 3D Remix. © Mojgan Matloob. All rights reserved.

Why may your virtual designs be particularly useful during the coronavirus pandemic, and potentially afterwards?

Nowadays more than any time, our school system has become dependent on distant learning due to the lockdown. Many teachers and educators have found creative ways to surmount the challenge by drawing on current apps and previously funded simulation platforms. However, there are not sufficient resources to comply with NGSS, equity or multimodality aspects of teaching. The science and engineering online courses often suffer from the shortcomings of remote science labs, particularly; 2D restrictions of the screen, sensory memory overload, and lack of versatility for different learning styles. With the AR platform, students have more possibilities of interactions and an extended field of view to interact with the surroundings that can significantly improve visualization. I believe virtual learning would be on the rise after pandemic because of several reasons:

1. *Many institutions and funding agencies that have been so far slow to respond will consider TechEd solutions as the pandemic urges the transition.*
2. *There have been already lack of instrumentation and space that would more affordable and accessible through AR.*
3. *The online education industry was surging even before pandemic with low quality of online labs.*
4. *There will be a new demand for teaching more sophisticated concepts as we are on the verge of technology transformation, for example, shortly, the quantum information will transform the computer chip industry.*
5. *Open sources are rising with free books that are mostly plain PDF.*
6. *New use cases are on the rise, such as adding new dimension to books or hosting digitally rendered science objects to classroom.*

Bio

I am a physics educator and STEM media designer. I am also a discipline based educational researcher and have developed assessment tools to probe students' hierarchies of cognitive processing and derived models for students' reasoning.

My interest is in putting educational research and emerging technologies into the practice of science communication.

In the near future, what plans do you have for your designs and how you will share them with the world?

My interest in applying visualization techniques intensified after I performed a cluster analysis on the conceptual structure of students' written responses as a part of my doctoral dissertation.

The outcome showed a demand for a more qualitative and visualized approach toward scientific communication with an emphasis on the visibility of the links between concepts.

As such, I am forming a start-up called VISTA LINKS SCIENCE LABS (VLS labs) aimed at using augmented reality platforms in teaching sciences, engineering, and workforce training. The theoretical framework behind our designs is to make the links and connections visible to the learner. I have applied for several grants and will apply for the SBIR grant to create designs. I will share the renderings through different platforms.

Final thoughts

In response to a demand for educational tools to become more visual, Mojgan Matloob designs media and digital visualizations to convey complex scientific concepts to students, while encouraging innovation in the field of science communication.

As countries start to recover and slowly 'return to normal' after coronavirus lockdowns, these tools could prove ever more useful as virtual learning and remote working becomes more commonplace.

Links

Email:
Physicsbiology505@gmail.com

[LinkedIn](#)

The background is a complex, abstract composition. It features a color gradient from a vibrant red on the left to a pale yellow and white on the right. The surface is covered in numerous small, dark brown and red splatters, giving it a textured, weathered appearance. Several thick, dark grey or black brushstrokes are applied vertically, with some showing a distinct, layered texture. In the upper left, there is a cluster of fine, parallel grey lines. The word 'ART' is centered in a bold, stylized font with a white fill and a dark outline.

ART

Art Science Complex

Bio

[ART SCIENCE COMPLEX](#) was founded with the intention of investigating our conjecture that the exercises of art and science (as well as all of the other speculative vocations, such as engineering, philosophy, mathematics, etcetera) stem from singular, rather than different and disparate, fundamental desires. As a result of our own work, and collaborations with our colleagues - and our ASC outreach and education programs - we set out to explore this initial hypothesis.

Distilling science as a platform for invention, Julie Rauer, Co-Founder of ART SCIENCE COMPLEX, creates metaphysical paintings and drawings, chamber pieces which investigate the nature, structure and function of organic transformations. Julie, an alumnus of The Cooper Union, has both exhibited her metaphorical paintings and drawings, written - collections of speculative science fables in her book, "Bezoar Thirst", and scores of nonfiction art-science essays and articles - and lectured, at esteemed institutions, nationally and internationally. Recognized by The National Science Foundation and the Journal Science, Julie was awarded the NSF and AAAS certificates, for two of her paintings, for two consecutive years



Bruce Gemmell, also a Co-Founder, is trained as an architect, and identifies with the broadest definition of that term. He has been practicing what he calls "Organic Design Thinking", a process he devised while a professor. The idea is to unconsciously nurture, rather, than consciously design - therefore exposing deeper desires and impulses from the imagination.

Artwork

Chatelaine for Anxious Days

Watercolor on paper

12 3/4 x 16 1/2 inches

Signature date: 1.27.20

© Julie Rauer. All rights reserved. January 27, 2020

Referencing the entire foundational structure, and pragmatic history, of The Metropolitan Museum of Art's sterling silver Tiffany chatelaine, expanding existentially upon its particular quotidian household tool attachments, Julie Rauer has transformed a fascinating temporal artifact into a metaphysical trawler of portable sanctuaries - creating organic "tool" attachments, hybridized biological mechanisms, metaphorical entities cultured from vital cellular matrices isolated and cultivated from nature, art and science, which have profound and boundless capacities to heal the fragmented soul: forest tool, painters studio as life cycle of vascular plants, symphony, Koi pond, library, epicurean pursuits in Kyoto cuisine, dissection of language evolving as writers tool.. all tethered to, and arborizing from an amphibious chatelaine head, visualizing the fantastical metamorphosis of the Eastern Newt, distinctive for its radical developmental morphologies.

Circadian Haunt: Cuscuta, Tuatara, and Daphnia Lens Multiple Sclerosis

Watercolor on paper

9 3/8 x 17 7/8 inches

Signature date: 12.11.17

© Julie Rauer. All rights reserved. December 11, 2017

Manifested in her metaphorical science painting, Julie Rauer has created a morphogenetic hierarchy of conceptual subsets, in this piece which was commissioned by Dr. Richard Scheuermann, Director of the J. Craig Venter Institute - to visualize his research to discover a cure for multiple sclerosis, via single cell genomics. Choosing cuscuta, the exquisitely adaptive and highly predatory siphoning parasitic vine, as primary metaphor for the systemic neurodegenerative rampage of multiple sclerosis, with its demyelination of nerve sheaths, astrocyte and mitochondrial dysfunction and excitotoxic damage, Julie has further elucidated the autoimmune beast within - equating the cuscuta's siphoning haustoria with the knight's lance, as an absent St. George slays the dragon, which is the knight.. and concurrent self-devouring beast.

Scaffolding the Tuatara, singular New Zealand reptile and evolutionary model organism, as secondary metaphor, Julie utilizes its unique parietal third eye, cranial apex photoreceptor key in modulating the Tuatara's circadian cycles, as relevantly complex connective element for the human circadian clock - which has protein and hormone malfunctions directly indicated as disruptive mechanisms in autoimmune disease; immune system cells each harbor their own circadian rhythms, acting as powerful inflammatory response drivers.

Speculating that circadian clock gene malfunction may be both one of the causes, as well as the results, of multiple sclerosis, Julie Rauer has here painted two daughter cells, in successive and simultaneous temporal states, undergoing early to late telophase mitosis - hypothesizing that flawed redistribution of caveolin-1 protein, during mitosis, specifically compromised relocalization (insufficient concentration of cav-1 in cleavage furrow) around the spindle poles at late telophase, may actually cause autoimmune diseases, particularly multiple sclerosis.

Visualizing the aforementioned daughter cells as an imagination forged dichotomy of Daphnia, water flea and model organism for toxic cross-talk (harkening directly back to the fractured microbiological dialogues inherent in the infernal physiological monologues masquerading as communication), in multiple sclerosis pathologies, and of monstrous astrophysics metaphor of circadian haunt and disintegration, utter breakdown of the twenty-four hour light/dark cycles.. cratered full moon infected by the molten core of an all-consuming sun, shooting solar flares into infected space.



Gastrulation of Erik Satie: Composing Tensegrities of Parasol Mycology

Watercolor on paper

11 x 18 7/8 inches

Signature date: 5.13.20

© Julie Rauer. All rights reserved. May 13, 2020

A critical metaphysical portrait of the highly eccentric and unconventional work of French classical composer Erik Satie, metaphorically depicted in the dynamic process of constructing his work - radically unpredictable music theories, tonal asymmetries and bristling aural textures embodied in experimental compositions, and deftly anachronistic singular personal and professional philosophies. Inventing classical music metaphors through the prism of interdisciplinary science, Julie Rauer manifests aspects of developmental biology, epigenetic mutation, early scientific instruments invented to identify and record phenomena in astrophysics and engineering, and mycology, specifically capturing the deliberately ephemeral nature of Satie's existentially fragile compositions, notably the tripartite elegance of his "Gymnopedies", pieces which hover in truncated dragonfly life, before vaporizing as Odonata notes. Striking the mycological model of *Parasola auricoma*, an "Ink Cap" mushroom with a thoroughly unique, astonishingly brief life cycle of only two to three hours, during which this Coprinoid spontaneously blooms, disintegrates, sporulates, then vanishes without a trace, as spectral colonies cede to damp silent ground emptied of civilization.



EXCESSIVE SYNCHRONICITY: Combating the Synaptic Monoculture of the Parkinsonian Brain

Watercolor on paper

12 5/8 x 18 inches

© Julie Rauer. All rights reserved. July 1, 2015

Commissioned to create a painting visualizing potential renegade research avenues, novel arenas of physiological inquiry and speculative medical hypotheses, in discovering an ultimate cure for Parkinson's disease, by the Founder and CEO of R&D Neuroscience nonprofit, Neurothesis, in Brisbane, Australia, Julie Rauer, Co-Founder of ART SCIENCE COMPLEX, invented and layered several metaphorical clusters to manifest the horrific menagerie of successively degenerative presentations of Parkinson's disease, as structural and functional scourge—the existential perils of monoculture versus polyculture in plant science; symphonic classical music metaphor quantifying gravely deleterious martinet neuronal signaling, via rudimentary brass instruments without valves or other cognitively nimble pitch-altering devices, constrained in their abilities to manifest layered aural colors and textures, in comparison with complex textures and harmonic capabilities of valved brass instruments, as the adaptive neuroplasticity marking healthy brain function; deliberately induced visions of Indian Sadhus as metaphor for the tragically altered perceptions, hallucinations and "facial masking" consistent with third stage Parkinson's disease—composed to visualize both the surreally terrifying psychological landscape and neurobiological intricacies roiling within the resplendent beauty of synaptic architecture.

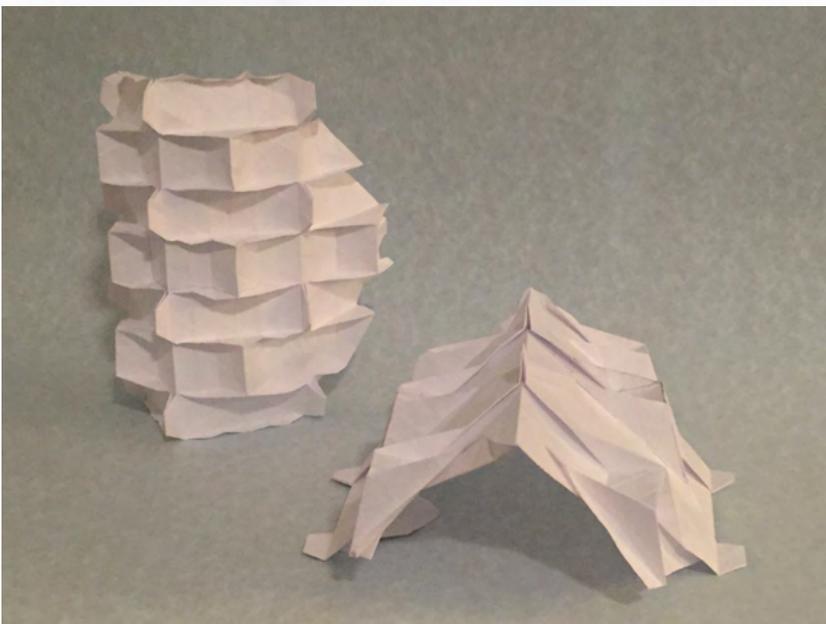


Katana: The Host (above)

Medicinal Chinese fish infested with artificial paper parasites to create architectural landscape. © Bruce Gemmell. All rights reserved.

Erica (right)

Paper and board model. Phase four of organically designed artifact as imaginary architectural environment. © Bruce Gemmell. All rights reserved.



Still life Vanitas (above)

Graphite and colored pencil drawing of Chinese dried medicinal fish, withering citrus and botanical elements.
© Bruce Gemmell. All rights reserved.



Corrugated space structures (left)

Folded paper models of corrugated designs of imaginary space encompassing structures, deployable from flat sheets of simple hexagons and equilateral triangles.
© Bruce Gemmell. All rights reserved.

Entre les soussignés :

Pierre Paul Frédéric Grossard agissant comme mandataire et au nom de Pierre Hipolyte Grossard père, propriétaire, demeurant à Bordeaux, allées d'Orléans N^o 36

Et monsieur Chenot fils, sellier carrossier, demeurant à Bordeaux cours du Jardin Public N^o 44.

Il est convenu ce qui suit :

Le sieur Grossard donne par ces présentes à titre de bail à loyer, pour trois années consécutives, qui prendront effet du premier Janvier mil huit cent soixante deux et qui finiront le premier Décembre mil huit cent soixante quatre, au dit sieur Chenot fils, ce acceptant, un magasin possédé par le dit sieur Grossard à Bordeaux, cours du Jardin Public N^o quarante quatre, consistant en un magasin, d'un premier et d'un second étage, telle qu'elle est représentée par le plan ci-joint, avec toutes les servitudes et dépendances. Le sieur Chenot fils est autorisé à faire, pendant la durée du présent bail, toutes les réparations nécessaires, sous les clauses et conditions qui pourront lui être imposées par le sieur Grossard, pourvu qu'il ne fasse aucun dommage ni inconvénient à son voisin, et qu'il ne dégrade rien de la maison. Le sieur Chenot s'engage pendant la durée du présent bail à payer au sieur Grossard, au jour de son paiement, pour les réparations d'entretien, peintures d'intérieur, blanchissage des murs et des plafonds, et pour faire entreprendre à ses frais toute réparation d'agrément qu'il sera jugé à propos de faire. Il est convenu comme clause expresse qu'à l'expiration du bail, le sieur Chenot laissera la dite maison sans aucune dégradation, et sans rien détruire, changer, ou modifier ce qui aura été fait pendant la durée de son bail, et sans pouvoir exiger aucun remboursement pour tout ou partie des dépenses qui auront été faites à la

Written
Word

Neus Figueras

They say that the ocean has been discovered less than deep space. Understandably, we have always had a fascination for the marine world, which can seem like an alien planet on Earth. Having been awed by the ocean, Neus Figueras pursued marine science, but is also a writer. Now, both skills are combined as Neus tells tales of ocean adventures in the production of the fictional book 'Lorac', to inspire teens and adults to the wonders of the ocean in a visual and memorable way.

Left: Book cover of 'Lorac' illustrated by Evan Piccirillo. © Neus Figueras. All rights reserved.

Below: The Burmese island where the author led a coral restoration project and which inspired one of the settings of the novel by Neus Figueras. © Neus Figueras. All rights reserved.



Q & A - Neus Figueras

What inspired you to pursue marine science?

I have always loved the sea. I'm drawn to it and it recharges me. Ever since I went to school I've liked science. I am a curious person and science is about pursuing that curiosity.

While in high school it was quite easy for me to choose science over the humanities—I thought I could always write and train as a writer in my spare time—it was impossible to choose just one scientific discipline when time came to go to university. Then I discovered that oceanography covered all the scientific disciplines that applied to the oceans, and it was clear to me that this would be my career.

It seems you have travelled to many parts of the globe for field work, how has the natural environment at these locations contrasted?

It's like watching a performance played by different actors in every part of the globe. Are the primary producers here played by coral reefs, plankton or algae?

Who are the herbivores this time?

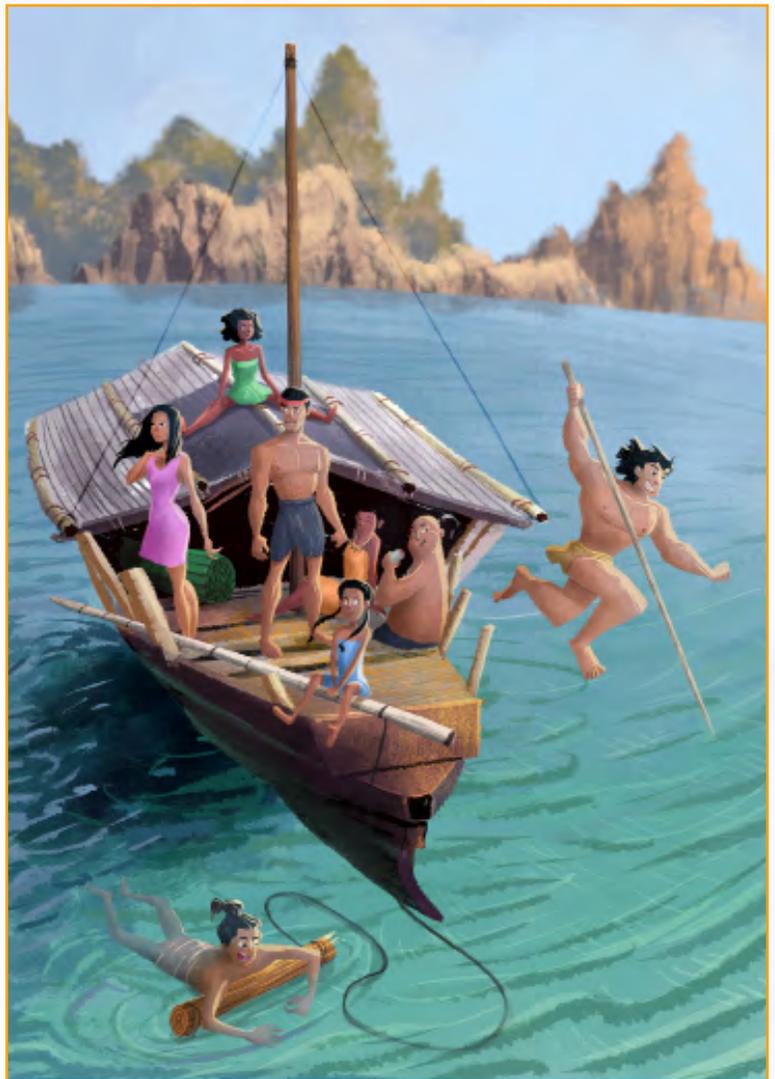
And the carnivores?

Cleaners, recyclers . . . All of them together will set up a different scenario too, with the unique props found at each site. That diversity is simply fascinating.

The only boring and bad actor in this play is the human pressure, which has not only forced its appearance in all the performances in the world, but is slowly driving everyone else off the stage.

How, through creative writing, do you communicate marine science to younger generations?

I combine my scientific knowledge and creative writing skills to write a story. Stories have been told since centuries to create emotional



Above: Illustration of Lorac with his Moken family by Evan Piccirillo.
© Neus Figueras. All rights reserved.

connections and explain facts about nature and society. So I rely on this ancient legacy that makes us love stories and remember them.

The stark difference between communicating information and telling a story is that stories are dynamic, while facts are static. When we read a story, we are riveted when the characters face risks and elated when they overcome them.

If you present logical thoughts to your audience, they may agree with you but still not respond to the call because people rarely act by reason alone. You have to tap deeper; you need to bind information to something that resonates with them.

Therefore, I use creative writing to link the idea I want to communicate with emotions. If you have a vivid vision of what you want to tell, come up with an imaginative plot and put it all together into a well-crafted story, then you may not only communicate but also inspire.

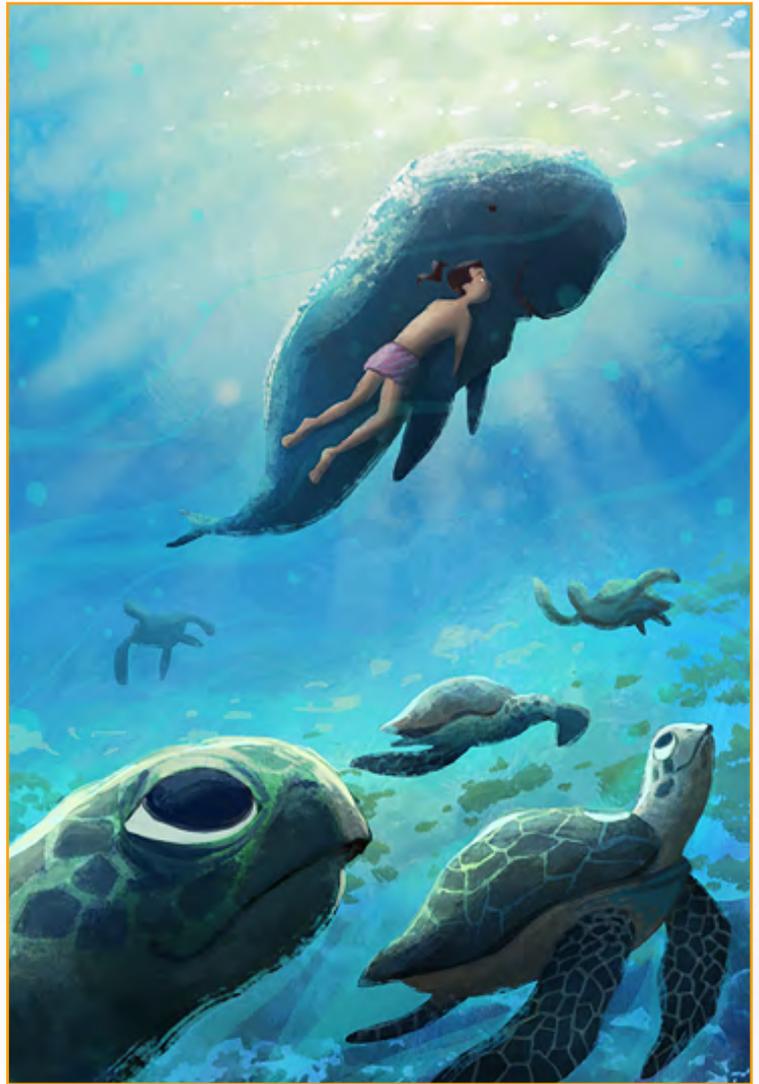
Please tell us about your latest publication, Lorac, and briefly the journey the main character goes through in the story.

The aim of this book is to wrap one of the most important scientific messages of our time into a single compelling story for teenagers and adults. Lorac is a boy who leads a nomadic life by the sea with his family of Mokens, an indigenous community from Myanmar.

His destiny, however, is even more tied to the sea than living on a boat, and a series of unfortunate events plunge him into the heart of the sea, where he discovers a world that remains invisible to many—beautiful, ingenious, vitally connected to life on Earth and with a terrible threat ahead.

When this threat takes over the marine world, Lorac has to return to the place he once knew and now no longer knows, in a daring attempt to save the ocean and the planet.

Though he endures many hardships, he also has fun and meets lovable friends on his journey of hope and courage that invites the reader to connect with community and nature.



Above: Illustration of Lorac with a dugong and turtles by Evan Piccirillo. © Neus Figueras. All rights reserved.

Final thoughts

Having been exposed to the wonder of the ocean while growing up and studying oceanography and marine biology, Neus Figueras has created a marine adventure story for teens and adults to share the wonders of the marine world and the need to conserve this precious environment. ‘The book ‘Lorac’ can be downloaded directly [here](#), where an optional donation can also be made to encourage more people to live an adventure true to the good of our planet.

About the author

I’m Neus Figueras and I’m an oceanographer, marine biologist and writer. My main focus has been on marine ecosystem restoration projects.

I am currently using my creative writing skills to convey in an engaging and clear way the urgent need to protect nature.

Links

[Lorac’s page](#)

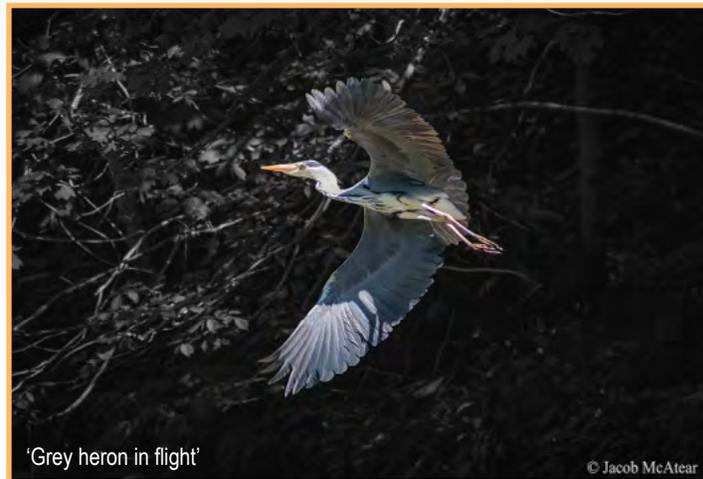
[Facebook](#)

Instagram: [@NeusMarine](#)

Twitter: [@NeusMarine](#)

The Heron in the Woods

By Jacob McAtear



'Grey heron in flight'

© Jacob McAtear

Beneath an empyrean wonderfully awash with blue, between trees now green with vernal growth, across glades embroidered with wildflowers, I wander, the flora and fauna my only companions.

As heavenly as it sounds, this is a place I normally avoid despite it being close to home, for nestled here within this wooded environment is a holiday park containing hundreds of caravans and luxury cabins, a profound attractant for people and their beloved canine pets, which, let us be honest, are two of the biggest banes of the lives of wildlife. But things are different now; the current coronavirus crisis means that the holiday park is as good as empty, no holidaymaker to be seen or heard.

Thanks to this current scarcity of hikers, bikers, joggers and dog-walkers, my relaxing stroll is filled with the most delightful surprises even at the stroke of noon when I would expect most wild animals to have long sought out the quietude of a hidden refuge far from any beaten path.

As I tread noiselessly along a sylvan trail, its green margins dotted with dandelion-yellow and forget-me-not blue, and thronged with the white of wild garlic, a roe deer slips out into the open twenty yards ahead and pauses just long enough for me to whisper, 'Hello you!' At that very moment, as if on cue, a shower of fluty notes rains down on me from the canopy, the entrancing source whence the melody pours forth, the aptly-named nightingale of the north, of course.

The blackcap isn't the only one with something to say on this awfully fine, late-spring day. A chiffchaff's repetitious choice of words and a chaffinch's merry roundelay contribute, too, to the tuneful mix of sound that suffuses and supplements the forest's serenity. I saunter further along the footpath when, out of nowhere, I become witness to a spectacular sight. What I see in the woodland understorey, halfway

between the bottom of the vibrant, sunlit, leafy roof and the carpet crammed with sun-kissed bluebells, is nothing less than a grey heron in flight!

At first, this spirit of water—of rivers, of lakes—appears rather out of place, but it traverses the woodland as though it is business as usual, its angelically-proportioned wings beating unhurriedly but resolutely, gracefully yet purposefully, the heron's height in the air held beautifully in equipoise.

The bird's head and neck are tucked in close to its body, so much so that they all seem to melt together causing it to appear as though there is no neck at all. Protruding conspicuously from a black-and-white face is a polished, bright orange, dagger-like beak. At the opposite end of the creature, two, long, murky-orange legs stick out, outstretched, parallel to the ground, and are joined to a pair of giant feet.

Just seconds pass by before this magical moment, like a mysterious apparition, dissolves into the forest as fast as it materialised and I am left in a state of awe about what I just saw. Although the River Lowther is just a stone throw away, this fact fails to take any of the surrealness away.

I meander slowly out of the woodland as my daily dose of nature draws to an end, but prior to my exit, I come across more little creatures that I seldom see: two shrews, one following the other, half a dozen voles frolicking in the leaf litter, and a red squirrel rummaging around on the ground. Could that be why the heron is here in the woods? All these small mammals are potentially on its menu, and now with fewer folk around there seems to be a lot more of them braving the open.

Bio Jacob is local to Cumbria and regularly hikes in The Lake District National Park where the wildlife and landscapes serve as the subjects of his nature writing.

Links Web: lakedistrictnaturewriting.co.uk
Twitter: [@JacobMcAtear](https://twitter.com/JacobMcAtear)
[Join newsletter](#)
[For commissions](#)

Genetic Unmarking

By Sam Illingworth

Beneath empty plaques
and unmarked plots,
the misplaced dead
lie resting.

The blankness of
their generic monuments
a simple sleight of hand:
these fragmented
piles are lost,
but not forgotten.

Combing through ancestral
records of digital lives,
vibrant patterns emerge:
one daughter, arriving premature
atop a secluded knoll;
two lovers, wed beneath
a harvest moon;
three believers, reborn
inside a pitted font.

These are the memories
that lie buried beneath
the topsoil,
every unmarked plot a
weathered 'X' that
peaks vanishingly from
stunted branches of
ancestral foliage.
An enigma interred
beneath the decades;
its cipher concealed in
markers that cannot
escape the lineage
of their past.

Author's note

This poem is inspired by recent research*, which has combined genealogy and genetics to potentially identify thousands of individuals in Québec whose remains lie in unmarked graves.

*Harding, T., Milot, E., Moreau, C., Lefebvre, J.F., Bournival, J.S., Vézina, H., Laprise, C., Lalueza Fox, C., Anglada, R., Loewen, B. and Casals, F., 2020. Historical human remains identification through maternal and paternal genetic signatures in a founder population with extensive genealogical record. *American Journal of Physical Anthropology*.

Bio

Dr Sam Illingworth is a Senior Lecturer in Science Communication at the University of Western Australia, where his research involves using poetry as a facilitatory tool to engender dialogue between scientists and non-scientists.

His recent book *A sonnet to science* (Manchester University Press, 2019) investigates poetry written by famous scientists and the impact that this had on their lives and research. Sam is also the founder of the science and poetry journal *Consilience*.

Links

Twitter: [@samillingworth](https://twitter.com/samillingworth)

Website: samillingworth.com

[‘The Poetry of Science’ Blog](#)

[‘The Poetry of Science’ Podcast](#)

[Consilience journal](#)

Who the Genie is?

By Annelise Lords

Yep, too much time,
We have more time since Covid-19
decided to visit,
Now we don't know what to do with it,
So we wait
Yep, we got more time.
We prayed for more time,
We planned what we would do if we had
more time,
Still, we wait
More time to reflect
To reconnect
To do this, or that
Yet we wait
The virus is here, It's there,
It's everywhere,
It grants wishes of more time to do
anything and everything
Does it matter who the genie is?
More time for animals to roam free
Reclaim what humans have taken
Accepting what their absence has given
Not caring who the genie is
Less humans, a less polluted world,
Animals getting their wish to be
undisturbed
In their habitat or home, in heaven or hell
Is this a dream?
Freedom for animals and nature,
Not caring who the genie is.
Not missing humans!

Bio

I am Annelise Lords, a Jamaican, medium writer and author.

Give me a topic and I will write a story that will touch your heart, along with beautiful pictures to make you smile. I believe that words are powerful and can be a tool or a weapon.

Links

[Amazon store](#)

[Medium profile](#)

[Medium podcast](#)

[Shutterstock](#)



NatureVolve

Bridging science & art

Thank you for reading issue 6!

We are now pleased to announce NatureVolve is available in print for readers in the USA and UK.

Issue 6 is our very first offered in print!

[Order issue 6 in print](#)

If you prefer digital but want to read more, you can [download our previous back issues](#) or [read them online](#).

[Download previous issues](#)

Another thank you to all contributors to our issues, our online following, as well as those who shared their thoughts of the publication with their [testimonials](#).

To let us know your feedback please [email](#) our editor, or to enquire to be featured, please [register interest](#) online. Alternatively, find us on [twitter](#) or [facebook](#).

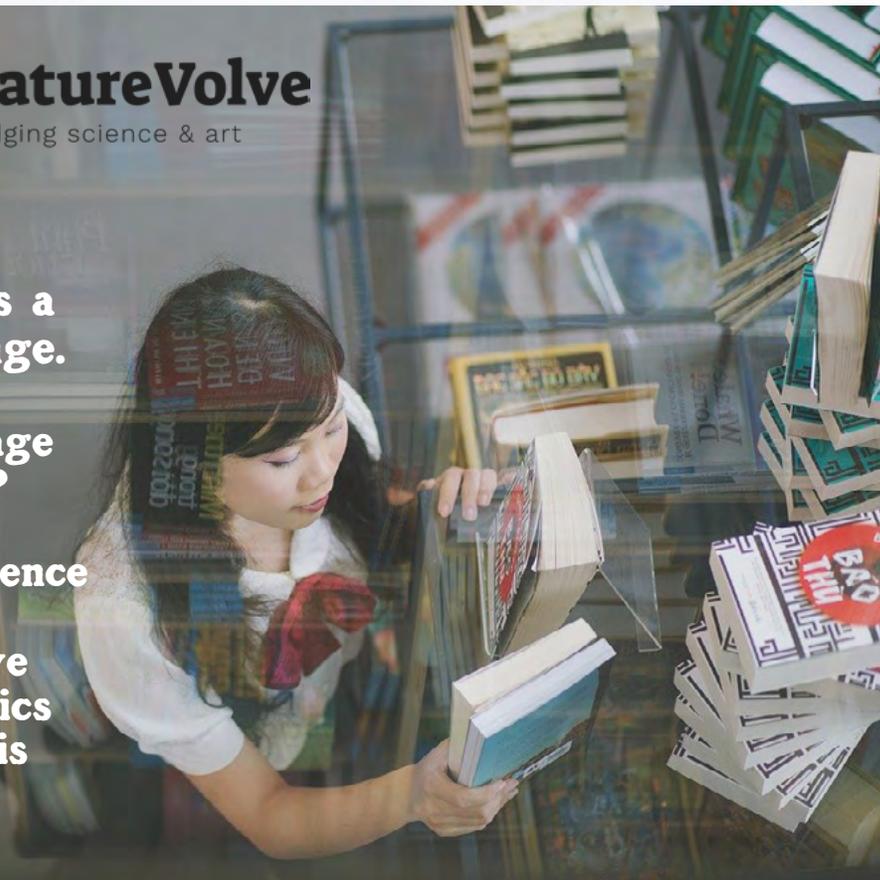




Communicating the STEM subjects remains a common global challenge.

How can we better engage the public with research?

We believe effective science communication can be achieved through creative story telling and aesthetics - which is why the arts is important to preserve.



We seek to support scientists and researchers engage their niche subject areas with the public with creative written and visual content.

Call for submissions

We are inviting applicable researchers and creatives to share their insights in the magazine:

If you are a..

- * STEM researcher**
- * Science communicator**
- * Conservationist**
- * Science-based organisation**
- * Creative artist or writer**



[Get in touch to register interest and let us know about your project.](#)

Have research news to share?

Obtain a custom-written press release or article for wide public distribution.





connecting science & society

About Us

We are artists, scientists, engineers, teachers, & entrepreneurs. We are building new programs, tools, databases, and conducting research that characterize and strengthen the network of access between science and society.

Find out what you can do >>

SCAN ME



www.stemadvocacy.org