THE GUY FOUNDATION

Quarterly Review

June 2025

Welcome to the 12th edition of the Quarterly Review, a digest of The Guy Foundation and quantum biology news.

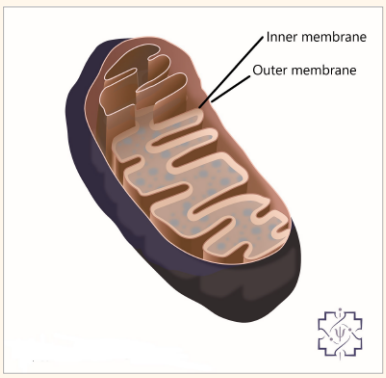
Contents

Quantum biology, ten years on

In 2015 the science writer Philip Ball gave a **talk** for the Royal Institution, introducing the topic of quantum biology. The talk covered a number of topics familiar to those doing research in the field. First, Philip asked is it likely that novel quantum effects would survive the warm, wet, and messy environment typical to living systems? The talk then went on to describe some of these effects, such as tunnelling, entanglement and coherence and the biological contexts in which they occur, including olfaction, magnetoreception, and photosynthesis.

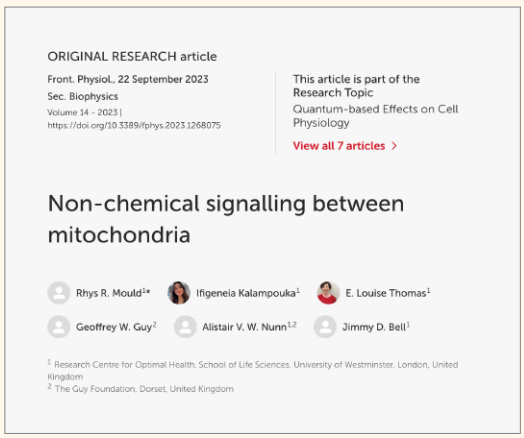
It is interesting to compare this 2015 presentation with the state of the field a decade later and we felt it was important to take this moment to celebrate the strides that have been taken in this relatively short period. Although some scepticism remains, the question seems less 'what is quantum biology' than 'what can we do with quantum biology'. Indeed, one of the biggest shifts in the field has been the movement towards the practical, therapeutic application of quantum biology in the medical context.

The Foundation has noticed a similar trend in our own publications output. Ten years ago, we were publishing predominantly hypothesis driven papers, exploring fundamental questions such as whether **quantum effects play a role in mitochondrial function**.



The mitochondrion, often called the powerhouse of the cell, is the central site of energy production and management in eukaryotic cells. It also plays an important role in biological signalling mechanisms.

In the last few years, theory has been joined by experimental evidence and the publication of data from our research teams, to support and extend the ideas of quantum biology. This experimental evidence has included **non-chemical communication between mitochondria**, **biophoton production during plant growth**, as well as the effects of **different wavelengths of light on healthy and diseased cells**.


ORIGINAL RESEARCH article

Front. Physiol., 22 September 2023
Sec. Biophysics
Volume 14 - 2023 |
https://doi.org/10.3389/fphys.2023.1268075

This article is part of the Research Topic
Quantum-based Effects on Cell Physiology
View all 7 articles >

Non-chemical signalling between mitochondria

Rhys R. Mould[1]* Ifigeneia Kalampouka[1] E. Louise Thomas[1]
Geoffrey W. Guy[2] Alistair V. W. Nunn[1,2] Jimmy D. Bell[1]

[1] Research Centre for Optimal Health, School of Life Sciences, University of Westminster, London, United Kingdom
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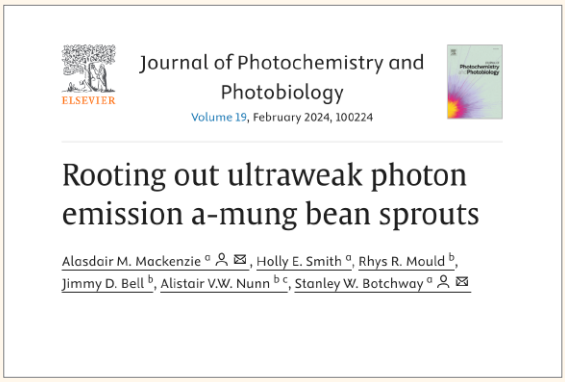
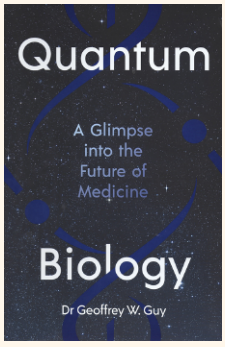
This interest in the role of light in sustaining and facilitating life has also produced groundbreaking research on **superradiant states in microtubules**, with implications for the understanding and treatment of **neurodegenerative conditions such as Alzheimer's disease**. Indeed, the therapeutic applications of quantum biology and the wider study of electromagnetic properties in living systems – topics which were almost completely absent from the conversation a decade ago but where we have also been pleased to sponsor research – suggest an exciting **new future for medicine**.


ELSEVIER

Journal of Photochemistry and Photobiology
Volume 19, February 2024, 100224

Rooting out ultraweak photon emission a-mung bean sprouts

Alasdair M. Mackenzie [a], Holly E. Smith [a], Rhys R. Mould [b], Jimmy D. Bell [b], Alistair V.W. Nunn [b c], Stanley W. Botchway [a]



We have no doubt that quantum biology will look completely different in another decade's time – if you haven't already seen it, Geoffrey Guy makes some predictions in his recent book **Quantum Biology: A Glimpse into the Future of Medicine**.

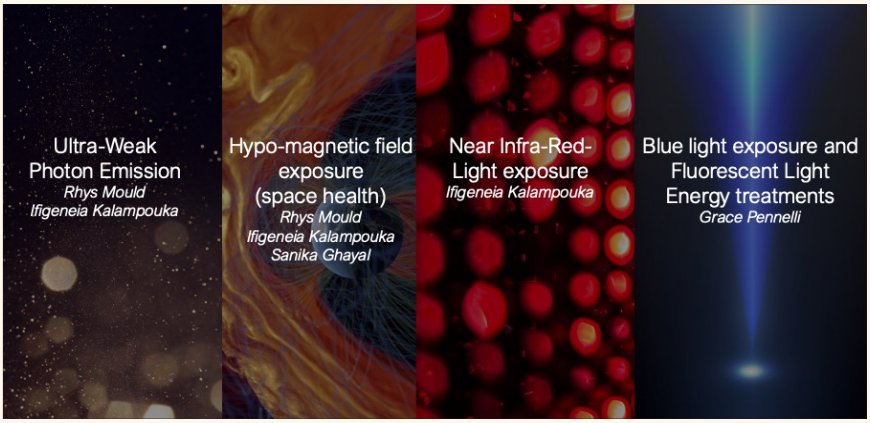
Research Meeting at Harwell

Speaking of our research, we had a very successful meeting at the Harwell campus in early June, attended by the Foundation's researchers from the Central Laser Facility at Harwell and the University of Westminster, and Geoffrey Guy, Nina Copping, Ffion Prestidge and Alistair Nunn from The Guy Foundation team.

The Foundation team at the Research Meeting. From left to right: Ifigeneia Kalampouka, Rhys Mould, Alix (Alexandra) Bailie, Stan Botchway, Alasdair Mackenzie, Geoffrey Guy, Nina Copping, Jimmy Bell, Louise Thomas and Sanika Ghayal.

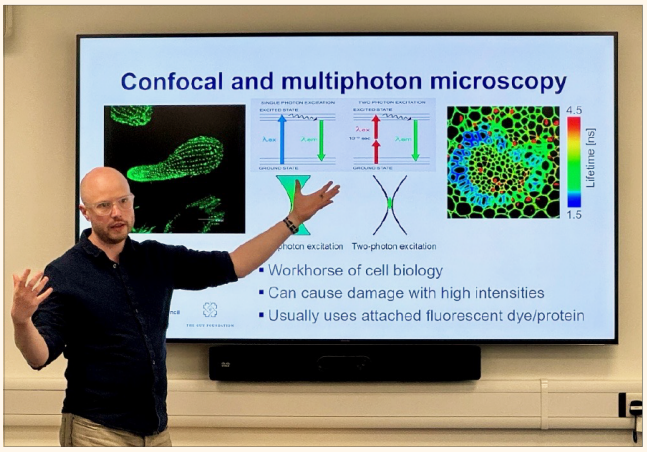
The day started with a tour of the new **EPAC facility (Extreme Photonics Application Centre)** where they are developing new laser technology that can convert a few hundred watts of energy into a concentrated femtosecond light pulse delivering from peta to exawatts of energy to a point measured in micrometres – with temperatures exceeding the core of the sun. The applications

are wide ranging, including investigating the deeper aspects of plasma physics, to generating X-rays, electrons, protons and other particles that can be used to study the effects of radiation – such as that experienced during space travel – on biology, as well as to study matter itself.



Rhys Mould's slide summarising the work at the University of Westminster lab.

This was followed by the research meeting itself, where the latest compelling data from the teams was presented and discussed. Overall, it supports the emerging evidence that both light, and hypomagnetic fields, do quite clearly modulate metabolism and cell function. Although more experimentation is required, not only will some of the ground-breaking data be published soon, but it is helping to point towards new avenues of research that could lead to clinical applications.

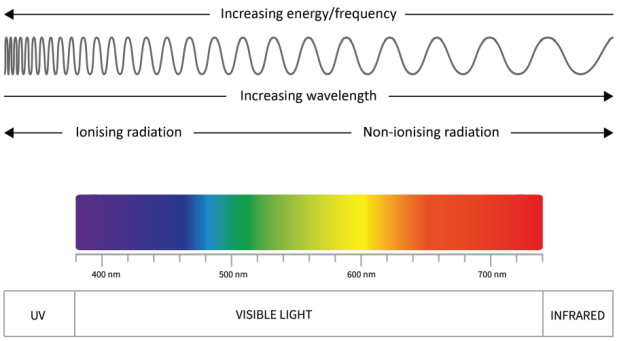


Alasdair Mackenzie presenting his research results.

Alix Bailie discussing her research results.

2025 Autumn Series on Light

In our conversations about quantum biology, the subject keeps returning to the fundamentally important interactions between light and living matter. We are therefore very pleased to announce that the **2025 Autumn Series** will focus on light, and particularly the physiological effects of different wavelengths of light, from infrared to UV. The 1903 Nobel prize was awarded to Niels Ryberg Finsen for his use of light therapy in the treatment of diseases, especially *lupus vulgaris*. Despite this, there has been surprisingly little progress in the use of light as an accepted, formalised therapeutic intervention. The Autumn Series aims to investigate the proactive use of light therapy as well as the growing evidence on the negative health effects caused by our reduced exposure to some wavelengths of light found in sunlight ("red light starvation"). We will also touch on the implications this has for our built environment, the places we live and work, and the new environments, such as space, in which we aim to settle.

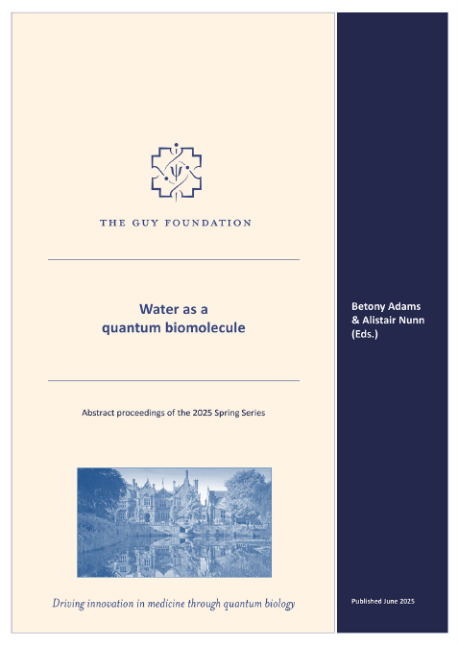


A section of the electromagnetic spectrum

These wavelengths represent light in the middle of the electromagnetic spectrum, from UV to infrared radiation. These wavelengths are neither very high energy, such as gamma rays or very low energy such as radio waves. Visible light, along with UV and infrared light, play important roles in biological systems. This is attested to by the numerous chromophores that absorb light of these wavelengths.

The Autumn Series will run fortnightly on Zoom, every Wednesday from 24 September – 3 December, at 10am–12noon ET | 3-5pm UK | 4-6pm CET. The programme is available on our **website** or see '**Dates for your diary**'.

2025 Spring Series on Water



The written Proceedings of the 2025 Spring Series on Water as a Quantum Biomolecule are now available on our **website**.

The series concluded on 21 May with a summary of the thought-provoking presentations, a short talk by Wayne Frasch and – as always – a stimulating roundtable discussion. The series looked at the complex role of water in biology, and to what extent quantum mechanics might be implicated in this role. Philip Kurian introduced the physics of water, with a list of features that give water its novel properties and the ways in which these features may be essential for life. Ali Hassanali then elaborated on the behaviour of water at different interfaces, such as soap bubbles, and how these model membranes might give us some insight into how water behaves at more complex interfaces such as mitochondrial membranes. Nathan Babcock then presented an overview of how quantum effects might be implicated in important biomolecules such as co-factors and proteins. Robert Fosbury and Alistair Nunn then explored the interaction of light with water, and how this plays out in the biological context, for instance, how its interaction with light may have played a role in the origins of life.

The videos of each of the talks are available on the Foundation's **YouTube channel**.

Space Programme Update

In our March Quarterly Review we announced the appointment of George Freeman MP as Advisor to The Guy Foundation to lead and coordinate our international Space Health Programme. We are delighted to share the following update from him:

Growing global awareness of the role of quantum biology in health & disease: harnessing space as the defining frontier

It's been a busy few months in my role as Advisor to the Foundation to help raise our profile and plan and co-ordinate our global development and partnerships work. Our initial focus is the field of space health and the growing interest in the causal mechanism of the long observed impacts of space travel on human health (deteriorations in bone density, retinal function and a number of other conditions typically attributed to exposure to zero gravity).

This phenomenon – described to me by UK astronaut Tim Peake when I was Minister for Life Science in 2014 – was the original trigger for my interest in quantum biology – which offers a potential explanation for this effect – and thus on the potential of quantum biology as an emerging field of life and health science. As former UK Minister for Life Science, Space & Quantum I was delighted to accept Geoffrey and the Trustees' invitation to help build global research collaborations to better investigate and understand this effect. There are a number of organisations who have a serious fiduciary, legal and commercial interest in understanding the impact of space travel on human health: from space agencies to health and space regulators to robotics companies and pharmaceutical companies. I am now reaching out to these stakeholders to explore potential collaborations and insights.

The announcement of my appointment in March coincided with the news that day, of the landing back on Earth of the "reluctant space

tourists": NASA astronauts, Butch Wilmore and Suni Williams, who were stuck in space for over nine months in after their Boeing Starliner spacecraft suffered multiple technical failures during its inaugural crewed test flight.

They launched on June 5, 2024, expecting an eight-day mission to the International Space Station (ISS), but issues such as thruster malfunctions and helium leaks prevented the Starliner from safely returning them to Earth. The astronauts remained on the ISS, completing experiments and spacewalks while awaiting rescue. Their return to Earth occurred on 18 March 2025, aboard a SpaceX Dragon capsule, which safely splashed down in the ocean off Florida. Both astronauts expressed no blame toward any single party but acknowledged shared responsibility among Boeing, NASA, and themselves for the mission's outcome. They described the experience as a test of resilience and said they would undertake the mission again despite the challenges.

The story highlights a number of the key issues underlying the growing interest in quantum biology and space health. Who is ultimately responsible for their extended "spacecation"? What will the impacts of unexpectedly prolonged space travel on their health be? Will their story deter or encourage market demand for space tourism?

Over the last two months I've been making contact with space agencies, space companies, astronauts, regulators and space policy leaders to explore global awareness and thinking on this topic, and explore the potential for a global research collaboration project on it. Watch this space.

George Freeman MP
Deputy Chair, Science, Innovation & Technology Select Committee.
Chair, All Party Science in Parliament Committee.
International Partnerships Advisor, The Guy Foundation

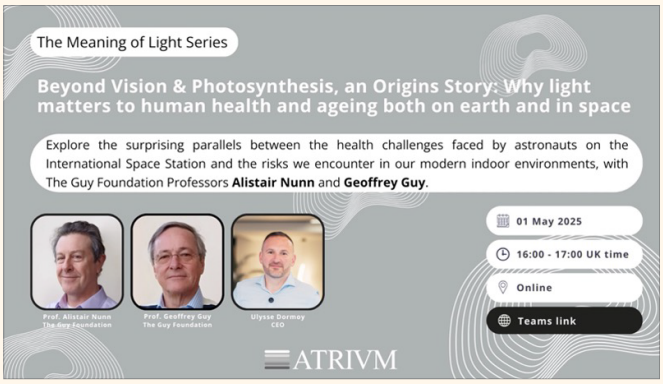
We are also pleased to share excellent news from The Guy Foundation Quantum Bioenergetics Laboratory. The School of Life Sciences at the University of Westminster has awarded two fully funded PhD studentships to support cutting-edge research in the field of Space Health. These studentships will include work on the biological effects of hypomagnetic conditions and the application of near-infrared (NIR) technologies – key areas within the emerging discipline of quantum biology.

Professor Jimmy Bell, Director of the Research Centre for Optimal Health at the University of Westminster, home of The Guy Foundation Laboratory, commented:

“ This decision reflects the University of Westminster’s strong commitment to advancing research in quantum biology. It is incredibly encouraging to witness the growing momentum within our research centre, and we are eager to explore further opportunities to expand and deepen our work in this vital field. ”

The deadline for applications has now closed and the successful candidates will start in the Autumn. If you are interested in hearing more about the space health programme please contact **Nina Copping**.

New Talk on Quantum Biology and Light



The Guy Foundation's Alistair Nunn gave a talk on light and health on 1 May. Hosted by Ulysse Dormoy from the lighting company Atrium, the 'Meaning of Light' series is an initiative to investigate the profound influence of light on human health and wellbeing, and what this means in the context of our changing light environment.

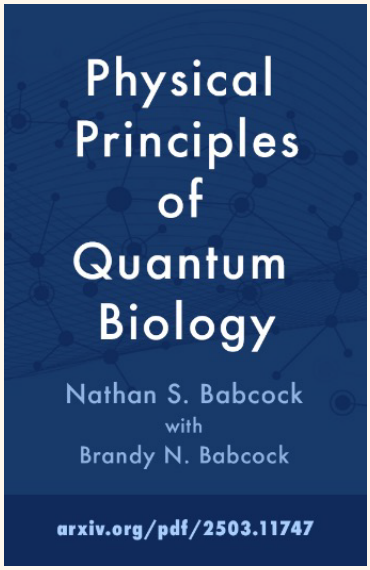
After an introduction by Geoffrey Guy, Alistair Nunn began his presentation with a short explanation of how we came to be interested in the effects of light on human health, which started with his research into cannabidiol fluorescence when he was working with Geoffrey and GW pharmaceuticals. This interest grew into a wider investigation of quantum biology, which includes topics relating to electromagnetic effects in biological systems. Taking the evolutionary approach that all living organisms on Earth evolved within a very specific set of physical conditions, for instance, a defined electromagnetic spectrum and magnetic and gravitational fields, led to the Foundation's focus on how different environments, such as space, might perturb the homeostasis of organisms that evolved in Earth's environment. Of particular interest was what the space environment might do to mitochondrial function, which is known to be perturbed in space, and how this might lead to the accelerated ageing phenotype that is observed in astronauts. In this talk, Alistair briefly outlined some of the ways in which this perturbation may occur, through red and infrared light starvation, circadian disruption, hypomagnetic fields, and reduced gravity.

The Foundation was very pleased to be part of this excellent series that is drawing necessary attention to the importance of understanding how light interacts with life. You can watch the talk **here**. Previous talks in the 'Meaning of Life' series are listed in the 'Light and life' section on our **Useful Resources** web page.

Physical Principles of Quantum Biology Book

We are delighted that Nathan Babcock, winner of the 2023 Guy Foundation Onion Prize, launched his new book 'Physical Principles of Quantum Biology' in March. Motivated by discussions at the first Gordon Research Conference (GRC) on Quantum Biology in Texas in 2023, Nathan wrote the book to assist researchers, especially those entering the field, to have access to a coherent overview of quantum biology.

The book, which will be periodically updated, is available on the physics arXiv. We link to it from **our website**. Nathan has also presented an excellent general introduction to quantum biology which you can view on his **YouTube channel** and he will be uploading chapter by chapter presentations of the full book over the coming months, see **Chapter 1 here**.



Nathan is an excellent teacher and these additions to the growing list of quantum biology resources are very much welcomed.

New Paper by Philip Kurian

Philip Kurian, from the Quantum Biology Lab at Howard University has a fascinating new paper out in the journal *Science*. The paper **Computational capacity of life in relation to the universe** extends ideas of how living systems compute information to include organisms without conventional computing apparatus such as neurons or brains. Philip recently concluded a 3-year project he undertook as part of The Guy Foundation's research programme, in which he investigated **superradiant states in microtubules**. His new paper builds on this evidence of superradiance to conclude an information processing capability that is favourably comparable to modern quantum computers.

Books & Papers

Journal club

For this issue's journal club, Alistair Nunn and Betony Adams have picked four thought-provoking recent papers.


The Journal of Physical Chemistry Letters > Vol 16/Issue 17 > Article

Cite Share Jump to Expand

PHYSICAL INSIGHTS INTO THE BIOSPHERE, ATMOSPHERE, AND SPACE | April 24, 2025

Imaging Ultraweak Photon Emission from Living and Dead Mice and from Plants under Stress

V. Salari, V. Seehan, L. Frankle, D. England, C. Simon, and D. Oblak*

Access Through Your Institution | Other Access Options | Supporting Information (1)

Abstract

The phenomenon of biological ultraweak photon emission (UPE), that is, extremely low-intensity emission ($10–10^3$ photons cm^{-2} s^{-1}) in the spectral range of 200–1000 nm, has been observed in all living systems that have been examined. Here, we report experiments that exemplify the ability of novel imaging systems to detect variations in UPE for a set of physiologically important scenarios. We use electron-multiplying charge-coupled device (EMCCD) and charge-coupled device (CCD) cameras to capture single visible-wavelength photons with low noise and quantum efficiencies higher than 90%. Our investigation reveals significant contrast between the UPE from live vs dead mice. In plants, we observed that an increase in the temperature and injuries both caused an increase in UPE intensity. Moreover, chemical treatments modified the UPE emission

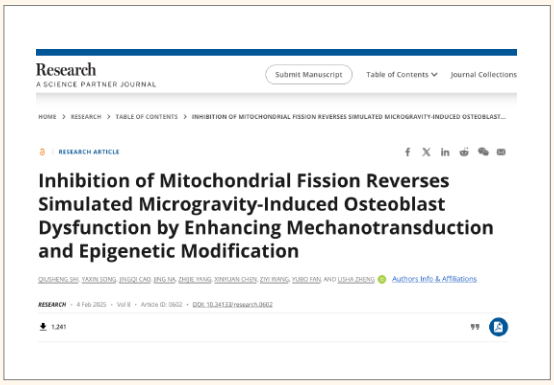
We were thrilled to see that biophotons are getting their moment in the spotlight, with a recent paper by Foundation faculty members Vahid Salari, Christoph Simon and collaborators, securing a prestigious cover spot in *The Journal of Physical Chemistry Letters*. The paper, **Imaging Ultraweak Photon Emission from Living and Dead Mice and from Plants under Stress**, documents experimental results of novel imaging techniques and conditions in the detection of biological ultraweak photon emission (UPE), often referred to as biophotons. The authors used electron-multiplying charge-coupled device (EMCCD) and charge-coupled device (CCD) cameras to detect these ultraweak photons with extremely high quantum efficiency. The results show that the UPE detected from living mice showed a significant difference from dead mice, implicating UPE in measures of vitality in living organisms. The research also demonstrated an increase in UPE for physiologically relevant conditions such as temperature increase and injury, as well as the application of chemicals such as anaesthetics.

Our recent meeting with Massimo Maffei from the University of Turin highlighted for us the growing amount of data, at least in the

context of plants, that attests to the effects of hypomagnetic fields on biological systems. We were thus very interested to read a recent article **Wandering of the auroral oval 41,000 years ago** in the journal *Science Advances* about the Laschamps geomagnetic excursion. In contrast to a complete reversal, a geomagnetic excursion relocates the Earth's magnetic poles, which can happen within the span of a human lifespan. The paper describes how the Laschamps excursion would have changed the Earth's magnetosphere and biosphere, going as far as to suggest that this may have played a role in the emergence of modern humans. As the field of spin chemistry expands to include biochemistry, there is growing evidence that a spin-based mechanism may play a role in the sensitivity of reactive oxygen species (ROS) to magnetic fields. Given the important role of ROS in signalling and inflammation this could have profound implications for magnetic pole excursions and reversals.

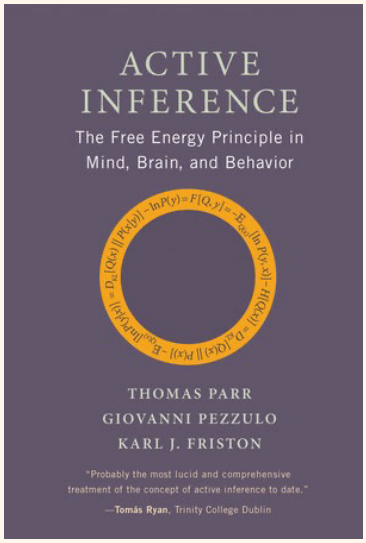
We are always interested in examples of collective intelligence or synchronised behaviours, and were intrigued when Alistair Nunn pointed out this recent Insights article **Archaea go multicellular under pressure** in the journal *Science*. Multicellularity likely evolved very early in evolution, as there is plenty evidence that prokaryotes in the deep past form cooperative colonies – which is very much the case today, for instance, as biofilms. It is thought that the modern eukaryotic cells evolved

from a symbiosis between two kingdoms, bacteria and Achaea. Intriguingly, recent research has indicated at least one way multicellularity may have been induced, it seems that a species of Archaea, *Haloferax volcanii*, can be induced to form multicellular colonies by application of mechanical pressure.



And finally, speaking of mechanical pressure, there has been a flurry of interest in space health in the last few months after the successful return of stranded astronauts Suni Williams and Butch Wilmore. A growing body of evidence suggests that mitochondrial function is compromised by space travel, as attested to in another recent paper **Inhibition of Mitochondrial Fission Reverses Simulated Microgravity-Induced Osteoblast Dysfunction by Enhancing Mechanotransduction and Epigenetic Modification**, published in the journal *Research*. Scientists used simulated microgravity to demonstrate changes to mitochondrial fission in osteoblasts through mechanotransduction mechanisms, and how these altered mitochondria in turn contributed to reactive oxygen species levels and decreased ATP production. In a further significant step, the paper's authors managed to mitigate some of these effects by targeting mitochondrial fission as a therapeutic modality. This has implications for maintaining astronaut health. implications for maintaining astronaut health.

Book corner



For this issue's book corner Guy Foundation faculty member Anthony Finbow has written a review of *Active Inference: The Free Energy Principle in Mind, Brain, and Behavior*, by Thomas Parr, Giovanni Pezzulo, and Karl J. Friston, published in 2022 by MIT Press. We were interested to hear more about this book given that several people have recommended it.

Active Inference: The Free Energy Principle in Mind, Brain, and Behavior
by Thomas Parr, Giovanni Pezzulo, and Karl J. Friston

Active Inference: The Free Energy Principle in Mind, Brain, and Behavior is the first detailed exposition of the active inference framework in print and a fascinating exploration of theoretical neuroscience. The work sets out by asking the question; How do living organisms persist while engaging in active exchanges with their environments? It posits that such organisms maintain their bodily integrity by minimising surprise, in perceiving their environment, through sensory observation and by exerting adaptive control on that environment.

The book describes the free energy principle (Friston 2009), whereby free energy is the measure of surprise or (more narrowly) prediction error between an internal model of the world and sensory inputs. Under active inference, perception and action are

two complementary ways to minimise free energy; perception, by (Bayesian) belief updating to make observations compatible with sensory inputs and action, by changing the environment to make it more compatible with beliefs or goals. Furthermore, active inference hypothesises that rather than passively receiving information, organisms actively infer the causes of sensory data by continuously updating their internal models and, most important, taking actions that fulfil their predictions.

While the book is conceptually and technically rigorous, it balances this with accessibility, making it suitable for researchers across disciplines, from cognitive science and robotics to psychiatry and philosophy of mind. The book is essential reading for anyone interested in exploring how minds and brains work. It offers a powerful and thought-provoking framework for understanding life, cognition, and behaviour.

We are grateful to Thomas Parr, one of the authors, who recently introduced his work to The Guy Foundation.

Conferences & Meetings

The Guy Foundation **website** includes a page dedicated to quantum biology related conferences and meetings, both online and in person. If you have any to add, please let us know.

The Science of Consciousness Conference 2025

We were delighted to see some familiar names on the programme for **The Science of Consciousness Conference**, which will take place from 6 – 11 July 2025 in Barcelona, Spain. The annual interdisciplinary conference is dedicated to all aspects of the study and understanding of consciousness. This year it has a dedicated quantum biology session, including presentations from Travis Craddock and Philip Kurian. Other topics include neuroscience, philosophy, psychology, biology, quantum physics, cosmology, meditation and altered states, AI/machine consciousness, culture and experiential phenomenology.

Quantum Technology in the Life Sciences (qLIFE) 2025

The **Quantum Technology in the Life Sciences** (qLIFE) conference will take place from 19 – 21 November 2025 in Woolyungah/ Wollongong, Australia. Described by the organisers as the first international conference series focused on the life sciences applications of quantum technologies, it will bring together researchers and experts from academia, industry and medicine from around the world to explore the latest advances and innovations.

QUEBS 2025

We are waiting for confirmation of whether the annual Quantum Effects in Biological Systems (QuEBS) conference will take place this year but hope to be able to share details soon.

MitOX 2025 Meeting

The annual MitOX meeting took place on 3 April at the John Radcliffe Hospital, Oxford, UK. We asked the Foundation's postdoctoral research fellow, Rhys Mould, for his thoughts on this year's meeting:

“ Every year in Oxford, MitOX puts the mitochondria, the powerhouse of our cells, in their rightful place in the spotlight for a day of talks, posters, and discussion on how these ancient organelles play roles in everything from cancer, neurodegenerative disease, immune responses and even consciousness. MitOX has a special place in my heart as the first conference I ever attended and remains my favourite opportunity to share new ideas, protocols and technologies on the organelle which are at the centre of all my research.

Some highlights for me this year include finding the mitochondrial enzyme complex ATP synthase, which harnesses chemical gradients to generate energy, fully functional outside the mitochondria. We saw how mitochondria are transported around the cell on tubulin highways, and how their speed can tell us about the state of the cell. Finally, we learned how changes in Complex I in the mitochondria can affect an organism's response to anaesthesia – does this mean the mitochondria hold the keys to unlock the mysteries of consciousness?

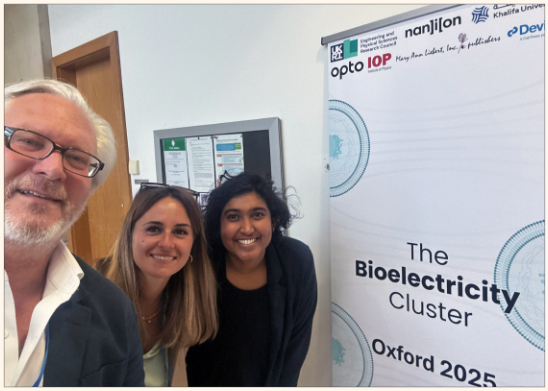
Just when you thought the breadth of mitochondrial research could no longer surprise you, MitOX proves you wrong. ”

Bioelectricity Cluster 2025 Meeting

The inaugural meeting of the Bioelectricity Cluster took place from 8 – 11 April at the University of Oxford, UK.

Mike Levin gave the keynote presentation, which you can watch on YouTube "**How does it know? Bioelectricity as memory medium, cognitive glue, & path to regenerative medicine**". We were interested to hear from Anthony Finbow that the meeting was an intensive, insightful and enjoyable four days.

A very well done to the organisers Malavika Nair, Rosalia Moreddu and Massimo Mariello, who are also guest editors for the Special Issue *Bioelectricity in Healthcare* in the journal Bioelectricity. This issue is open to external submissions of articles reporting on recent advances in bioelectricity in health and disease. The editors would welcome original research articles, reviews, perspectives, technical notes and protocols that report on recent advances in membrane electrical phenomena in health and disease. For more details see **their website**.



Anthony Finbow (left) with the organisers of the 2025 Bioelectricity Cluster meeting Rosalia Moreddu and Malavika Nair.

The next meeting will be hosted by the Allen Discovery Center at Tufts University, USA. Keep an eye on **their website** for more details.

Upcoming Bioelectricity Meetings

For those of you interested in bioelectricity and related topics, Michal Cifra shared this list of conferences and meetings coming up this year:

BioEM 2025, the largest and most significant international conference worldwide in the area of bioelectromagnetics, will take place from June 22 – 27 in Rennes, France.

The Asia-Pacific Radio Science Conference (AP-RASC) 2025 will take place from 17 – 22 August in Sydney, Australia.

The International Conference on Infrared, Millimeter, and Terahertz Waves (IRMMW-THz) 2025 will take place from 17 – 22 August at Aalto University, Espoo, Finland.

The Nineteenth International Congress on Artificial Materials for Novel Wave Phenomena – Metamaterials 2025, will take place from 1 – 6 September in Amsterdam, the Netherlands.

The European Microwave Week (EuMW) 2025 will take place from 21 – 26 September in Utrecht, the Netherlands.

Quantum Biology Seminars Round-Up

The Big Quantum Bio meetings

Clarice Aiello of the **Quantum Biology Ecosystem** organises these meetings which take place online every Thursday and are free to attend. If you are interested in giving a talk please contact Clarice.

Bioelectrodynamics seminars

These meetings are hosted by the **Bioelectrodynamics group** at The Czech Academy of Sciences. Video recordings of previous presentations can be viewed on **YouTube**.

QIS and Quantum Sensing in Biology Interest Group

The National Institutes of Health's **QIS and Quantum Sensing in Biology Interest Group** hosts online meetings that would be of interest to data/information scientists, bioengineers, chemists, biologists, physicists, and clinicians at NIH.

Job Opportunities

Postdoctoral, PhD and undergraduate research positions will be available from July 2025 in the **Fay group** – a new research group in theoretical and computational chemistry at UCLA.

We recently had a meeting with Massimo Maffei about the effects of hypomagnetic fields on plant growth. Massimo is Co-ordinator of the **Plant Physiology Unit** at the University of Turin. He mentioned that postdoctoral positions are available, for contact details see **here**.

The **Quantum Neurobiology Lab at the University of Waterloo** invites applications for a highly motivated and skilled Postdoctoral Fellow to establish, manage, and operate a neuronal culture facility for the study of Parkinson's disease.

Dates for your Diary

THE GUY FOUNDATION

2025 Autumn Series Programme

Light

Session 1

Light and life – an overview

Wednesday 24 September

Dr Robert Fosbury, UCL and the European Southern Observatory (ESO)

Session 2

The health effects of sunlight, UV and blue light

Wednesday 8 October

Professor Richard Weller, University of Edinburgh

Session 3

The therapeutic use of green light

Wednesday 22 October

Professor Mohab Ibrahim, Department of Anesthesiology, The University of Arizona

Professor Alistair Nunn, The Guy Foundation and University of Westminster

Session 4

Near infrared (NIR) starvation and the therapeutic use of red light

Wednesday 5 November

Professor Glen Jeffery, UCL

Programme continued on next page

THE GUY FOUNDATION

2025 Autumn Series Programme

Light

Session 5

Our evolving light environment and the impact on health

Wednesday 19 November

Dr Roger Seheult, Loma Linda University

Session 6

Improving our light environment for better health – special roundtable session

Wednesday 3 December

Stefan Behling, Foster + Partners

Dr Max Gulhane, Regenerative Health

Scott Zimmerman, Silas Inc

Ulysse Dormoy, Atrium Lighting

James Sherman, Foster + Partners

Followed by roundtable discussion

All sessions 15:00hrs – 17:00hrs UK-time on Zoom

Please contact **n.copping@theguyfoundation.org** to register

Community News

Postdoctoral scholarship For Lea Gassab

Travis Craddock has been busy setting up his new research group at the University of Waterloo, and we were very pleased to see that one of his new postdoctoral researchers, Lea Gassab, was selected to be a University of Waterloo Provost's Interdisciplinary Postdoctoral Scholar. Lea completed her PhD at Koç Üniversitesi in Istanbul, where her thesis focused on quantum neurobiology, quantum information and quantum optics. We were interested to see her **recent paper** that outlines different quantum theories of consciousness, with a focus on Posner molecule entanglement.

Postdoctoral researcher Lea Gassab in a wintery Canadian landscape

World-first Quantum Satellite Link

Francesco Petruccione, Director of the National Institute for Theoretical and Computational Sciences (NITheCS), has been in the news recently. Together with colleague Yaseera Ismail from Stellenbosch University and a team of Chinese scientists, they established the world's longest secure quantum satellite communication link. This entailed sending photons 12,900km between Stellenbosch, South Africa, and Beijing, China. The link utilised quantum key distribution to encrypt the information transmitted.

Quantum encryption relies on fundamental quantum properties that mean that quantum systems cannot be intercepted or measured without altering their quantum states. The experiment is an exciting step towards establishing worldwide quantum networks. You can read more about the research **here**.

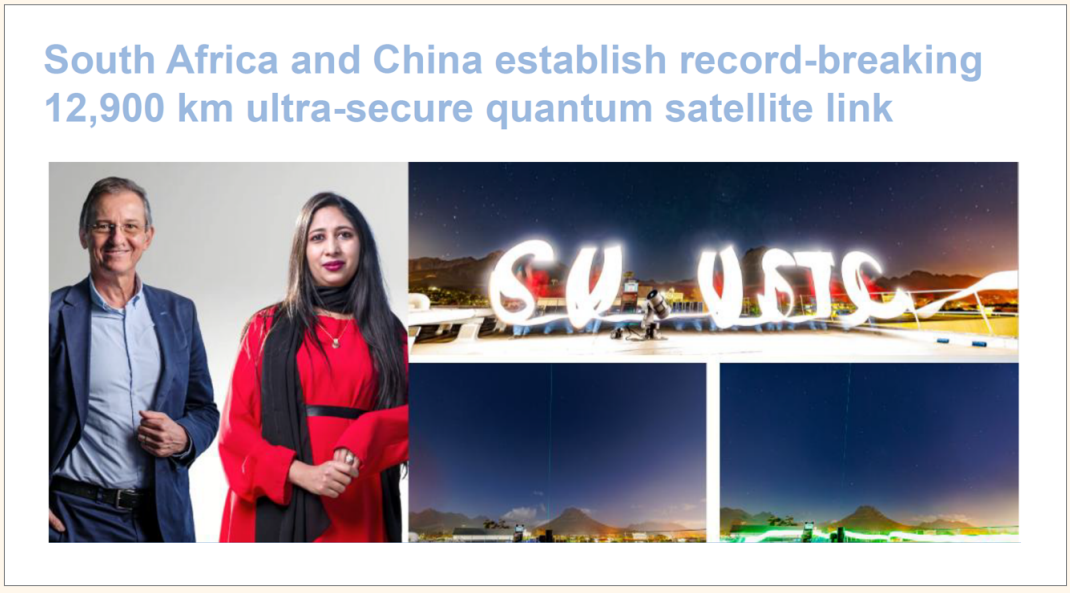


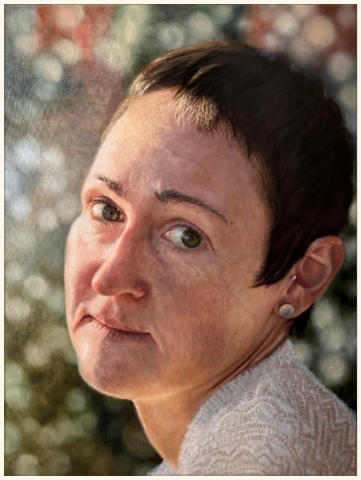
Photo credits: Profile photos Stefan Els | Experimental photos: Ignus Dreyers

Mini-school on Quantum Biology

The National Institute for Theoretical and Computational Sciences (NITheCS) recently organised an online mini-school on quantum biology. The weekly lectures, which took place in May, were presented by the Foundation's science communications advisor Betony Adams, who is also a postdoctoral researcher at the University of Stellenbosch in South Africa.

The mini-school began with a short history of quantum biology before introducing some of the important concepts in the field, from the point of view of both physics and biology. Lectures also addressed the different biological contexts in which quantum effects may play a role, which include photosynthesis, enzyme catalysis, DNA mutation, receptor binding, microtubule and mitochondrial function, magnetoreception, regulation of the production of ROS, calcium ion storage and release, and potentially, consciousness.

Videos of the lectures are available on the **NITheCS site** for those interested in catching up.



A portrait of Betony Adams by Margit Egg.
We were astonished to find out that Margit Egg, University of Innsbruck, is an incredibly talented portrait painter as well as an accomplished scientist. She painted this portrait after the recent Gordon Research Conference.

Pint of Science, UK

The Foundation's postdoctoral researchers Rhys Mould and Ifigeneia Kalampouka took part in a recent **Pint of Science UK** event, where they presented their research to a mixed audience of researchers and members of the public. Pint of Science is an initiative that aims to bring science out of its more formal environments and encourage curiosity and conversation.

Ifigeneia Kalampouka presenting her research

Rhys Mould presenting his research

For those of you in the UK, there is another event planned for 9 July, **An evening with astronaut Ricky Arnold**, which will take place at King's College London.

View from the Lab

We thought it would be enjoyable, in what is an increasingly online world, to take a peek at the landscapes of our quantum biology community, a glimpse out of our laboratory windows.

The entrance to the Research Complex at Harwell where Stan and his team undertake their experiments

To get the ball rolling we asked Stan Botchway, from the Central Laser Facility at Harwell, Oxfordshire, for his view. Stan is part of the Foundation's research team, investigating ultra-weak photon emissions and entanglement in biological systems and is a Scientific Advisor to the Foundation. He is assisted in his research by Alasdair Mackenzie and Alix Bailie, who are both experts in light-matter interactions and the intricate technology that is necessary to investigate these interactions.

Stan has an impressively broad range of research expertise, including the development of advanced microscopy, cellular DNA damage repair and the mTOR signalling pathway, ultrafast biophysics, time resolved linear and non-linear fluorescence spectroscopy and microscopy, and application of lasers to biology and medicine.

Read more about our recent research team meeting at the Harwell campus **here**.

“ Having the opportunity to work (or shall I say play) with high power lasers, advanced microscopes and detectors is such a privilege and great fun. Each day is made more exciting by the dedicated team around me. ”

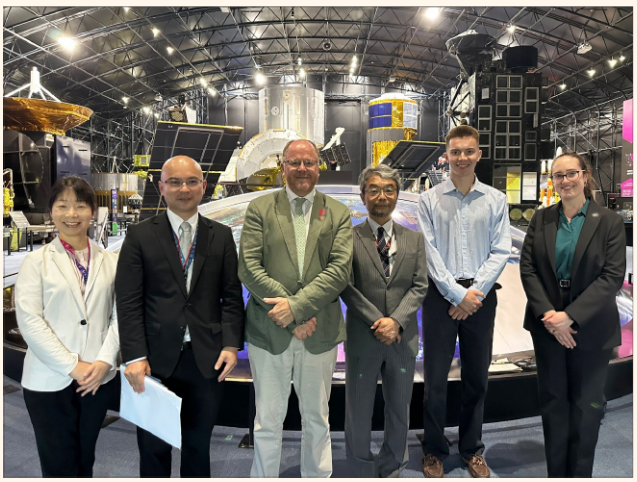
- Stan Botchway

The view from Stan’s lab at Harwell, showing the Rosalind Franklin Institute and a wealth of summer green

Please send us a photo of the view from your window for us to share in a future edition!

We hope you have enjoyed reading the Quarterly Review. Please feel free to get in touch with any suggestions for future editions - **n.copping@theguyfoundation.org**

The Guy Foundation team



George Freeman MP at the British Embassy, Tokyo and visiting the Tsukuba Space Center

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