



UNIVERSITY OF  
CAMBRIDGE



CAMBRIDGE  
SCIENCE  
FESTIVAL

Mon 13 Mar –  
Sun 26 Mar 2017

To pre-book, visit:

[www.sciencefestival.cam.ac.uk](http://www.sciencefestival.cam.ac.uk)

or call: 01223 766766

There is no need to pre-book events unless specifically stated in the programme

Bookings open:

Mon 20 Feb 2017

Lines open:

10.30AM – 4PM

Mon – Fri

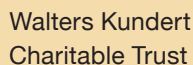
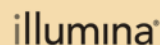
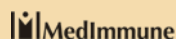
Useful information

Please contact us if you would like all or part of this publication in large font. An audio programme is available for download on the Festival website.

- Children under the age of 16 must be accompanied by adults at all times.
- You may be refused entry if you arrive after an event has started even if you have booked.
- Limited tickets will be available on the door for all pre-book events.

Your attendance at the Festival signifies your agreement to comply with the Guidance for Attending Cambridge Science Festival:  
[www.sciencefestival.cam.ac.uk/attending](http://www.sciencefestival.cam.ac.uk/attending)

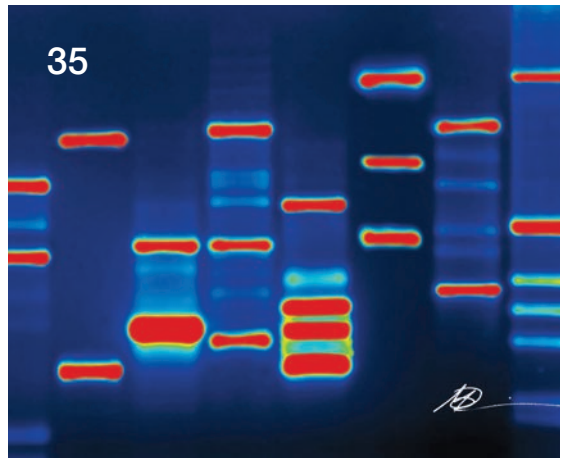
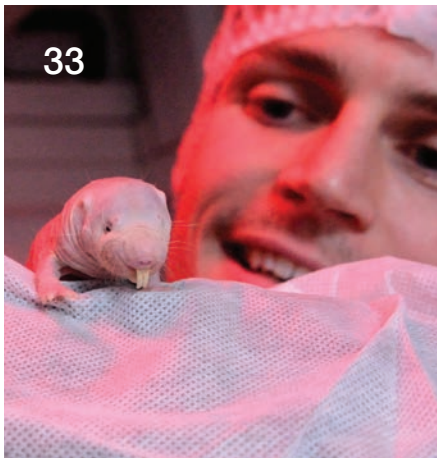
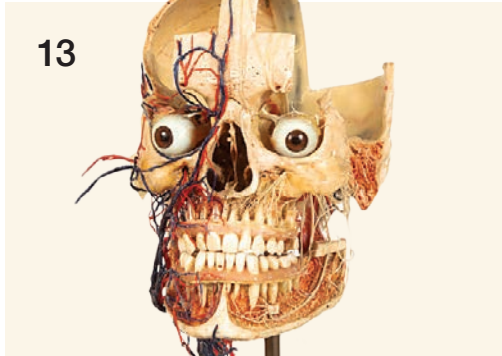
The University of Cambridge and our sponsors and partners are proud to present the Cambridge Science Festival:



**Welcome  
to the 2017  
Cambridge  
Science  
Festival**

# Explore this year's theme of getting personal

f cambridgesciencefestival  
t camscience | #csf2017



With events from astronomy to zoology, the 2017 Cambridge Science Festival welcomes everyone to explore and discuss science through talks, hands-on activities, performances, exhibitions and films. This year we are 'getting personal', looking at health and disease, our place in the world and our impact on the environment in which we live.

**EXHIBITIONS**

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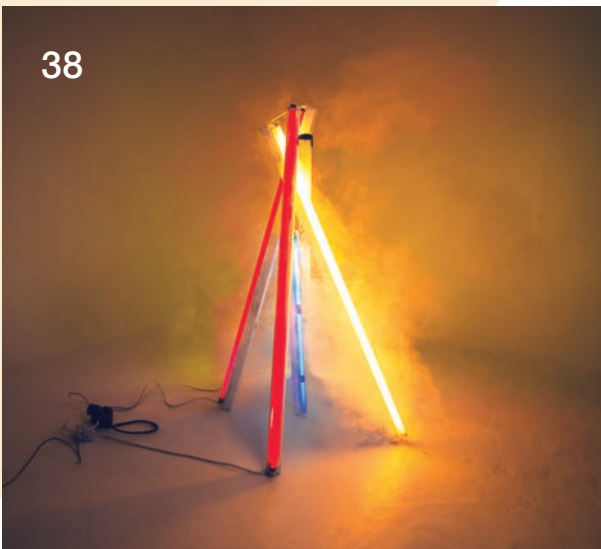
Tell us  
what you  
think

[www.sciencefestival.  
cam.ac.uk/feedback](http://www.sciencefestival.cam.ac.uk/feedback)

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07



# Exhibitions

## Feature Image

Gardening woodcut from Adam Lonicer,  
'Kreuterbuch' (1557) Christ's College, Cambridge





# Relationships, space and secret histories interpreted through installations, paintings, photographs and objects

## NOISY EMBRYOS

*Noisy Embryos* is an audio-visual installation by Deborah Robinson and David Strang that challenges the relationship between scientists and the animals they observe by juxtaposing controlled laboratory videos of snail embryos with the 'messy' process of field work. Presented with Anglia Ruskin University.

**10AM – 4.30PM**

→ **THU 9 MAR**

to **FRI 24 MAR**

**EXCEPT**

→ **SAT & SUN**

Ruskin Gallery, Anglia Ruskin University, East Road, CB1 1PT

## CREATIVITY AND CURIOSITY: ARTISTS AND ASTRONOMERS

An exhibition that explores the richness of space. By visual artists lone Parkin, Alison Lochhead and Gillian McFarland, as a response to dialogue with planetary geophysicists and astronomers from institutions including the Institute of Astronomy.

**10AM – 9PM**

→ **MON 13 MAR**

+ **TUE 14 MAR**

Yusuf Hamied Centre,  
Christ's College,  
St Andrew's Street, CB2 3BU

## MOLECULES THAT ROCKED THE WORLD

These 25 molecules have changed our life, culture and social trends. Discover more about their structures, history, properties, applications and significance using a stereoscopic 3D display.

**11AM – 5PM**

→ **MON 13 MAR**

to **FRI 24 MAR**

Department of Chemical Engineering and Biotechnology,  
New Museums Site,  
Downing Street, CB2 3RA

## THE SCIENCE OF HUMAN FLOURISHING

Interested in the big questions of life, purpose and meaning? Meet the team from the Faraday Institute and explore the interaction of science and religion: from AI and identity, genome modification and human dignity, to the wonders of the living world.

**4PM – 6PM**

→ **MON 13 MAR**

St John's College Old Divinity School, All Saints' Passage, CB2 1TP

## WHY IS THIS HERE?

Gain a better understanding about museums' relationships with objects as we explore histories that are secretive, forgotten about, problematic or just very weird. Investigate the objects yourself before museum colleagues elucidate the true, unexpected history. Part of *Why is this Here?*, our latest temporary exhibition.

**5PM – 8PM**

→ **WED 22 MAR**

Whipple Museum of the History of Science, Free School Lane, CB2 3RH

## THEATER OF PLANTS: HERBS, HONEY AND HORTICULTURE OVER FIVE CENTURIES

Treat yourselves to a bounteous display of all things botanical in our beautiful Old Library, featuring 16th-century herbal remedies, Charles Darwin's flesh-eating plants and Christ's College's glorious gardens.

**10AM – 4PM**

→ **FRI 24 MAR**

+ **SAT 25 MAR**

Old Library, Christ's College,  
St Andrew's Street, CB2 3BU

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[www.sciencefestival.cam.ac.uk](http://www.sciencefestival.cam.ac.uk)  
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There is no need to pre-book events unless specifically stated

# Talks



Feature Image  
Penguin meets person  
credit: Dean Evans, British Antarctic Survey



For adults, teenagers and families, Festival talks discuss the big questions in science today

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There is no need to pre-book events unless specifically stated

↓ **Mon 13 Mar**

**2017 ANNUAL WISETI LECTURE: A LIFE IN CLIMATE SCIENCE**

Professor Dame Julia Slingo, Chief Scientist and Director of Science at the Met Office, presents this year's WiSETI Lecture. Over the course of Dame Julia's career, climate science has undergone numerous transformations, helping us to observe, understand, simulate and predict how the climate system behaves.

**5.30PM – 6.30PM** Pre-book  
→ **MON 13 MAR**

Wolfson Hall, Churchill College,  
Storey's Way, CB3 0DS

**EXOPLANETS: ON THE HUNT OF UNIVERSAL LIFE**

The present collection of exoplanets includes gas giants and smaller planets believed to be of similar composition to Earth. Professor Didier Queloz shows how early results are paving the way for atmospheric studies of habitable terrestrial exoplanets. After much speculation and philosophical debate, the existence of life outside our solar system is close to becoming a testable scientific hypothesis.

**6PM – 7PM** Pre-book  
→ **MON 13 MAR**

Mill Lane Lecture Rooms,  
Mill Lane, CB2 1RW

**THE FUTURE OF MICROPROCESSORS AND THE TWO LAWS THAT DEFINE WHAT HAS HAPPENED AND LIMIT WHAT WILL HAPPEN**

Sophie Wilson designed the architecture behind the Acorn Micro-Computer, co-designed the ARM microprocessor and developed the Firepath processor that supports broadband infrastructure worldwide. This talk is about microprocessors, instruction set design and the future of microarchitecture and transistors, and is for anyone who wonders how their devices work and what may happen next.

**6PM – 7PM** Pre-book  
→ **MON 13 MAR**

Lady Mitchell Hall, Sidgwick  
Avenue, CB3 9DA

**YOUR DNA, YOUR SAY**

Your DNA is more personal to you than an iris scan or a fingerprint. Discuss the issues of donating, accessing and sharing genetic data with experts from the Wellcome Genome Campus.

**6PM – 7.30PM** Pre-book  
→ **MON 13 MAR**

Michaelhouse Café,  
Trinity Street, CB2 1SU

**ASTRONOMY THROUGH THE AGES**

Gary Fildes, Director and Founder of the Kielder Observatory, explores the impact of astronomy through history, leading up to present-day influences on the accompanying *Creativity and Curiosity* exhibition.

**7PM – 8PM**  
→ **MON 13 MAR**

Yusuf Hamied Theatre, Christ's  
College, St Andrew's Street,  
CB2 3BU



## HOW TO FEEL SAFE: WHICH INFECTIOUS DISEASES ARE GOING TO KILL YOU

The next big infectious disease is in the tabloids but the real killers lurk amongst us every day. Dr Colin Russell discusses what scientists are doing to predict the emergence of new diseases and combat existing threats.

**7.30PM – 8.30PM** Pre-book  
→ **MON 13 MAR**

Mill Lane Lecture Rooms,  
Mill Lane, CB2 1RW

## SEX, LIES AND BRAIN SCANS: CAN SCANS REVEAL WHAT GOES ON IN OUR MINDS?

Studies using functional MRI (fMRI) enable us to 'read minds' and detect conscious brain activity in patients who are thought to be in a persistent vegetative state. As our ability to read thoughts improves, what are the ethical issues? Professors Barbara Sahakian, John Pickard and Molly Crockett and Dr Julia Gottwald discuss what brain scans tell us, what they may tell us in the future and what impact fMRI may have on society.

Presented with  
NIHR Brain Injury HTC

**7.30PM – 9PM** Pre-book  
→ **MON 13 MAR**

Lady Mitchell Hall,  
Sidgwick Avenue, CB3 9DA

## CONFLICT OR MUTUAL ENRICHMENT?

Professor Alister McGrath considers the relationship between natural sciences and Christianity, focusing on the views of Albert Einstein, one of the most important advocates of a critical interaction between science and religion.

**7.45PM – 9.15PM**  
→ **MON 13 MAR**

Wesley Methodist Church,  
Christ's Pieces, CB1 1LG

## ↓ Tue 14 Mar

### STRANGE CHIMERA

Artist Julia Keenan discusses her project Strange Chimera, the process and results of developing art in response to the Whipple Museum's 19th-century anatomical models.

**12.30PM – 1.30PM**  
→ **TUE 14 MAR**

Whipple Museum of the History  
of Science, Free School Lane,  
CB2 3RH

### OUR DAILY BREAD: WHAT ARE WE EATING?

Bread is a staple food. Join archaeobotanist Professor Martin Jones, plant scientist Dr Lydia Smith and a local artisan baker to explore how modern ingredients and methods of mass production have completely transformed how bread is made and what we're eating. Presented by Cambridge Global Food Security Initiative, CambPlants Hub and Cambridge Forum for Sustainability and the Environment.

**5.30PM – 6.30PM**  
→ **TUE 14 MAR**

Department of Plant Sciences,  
Downing Site, CB2 3EA

### A VIRTUAL AUTOPSY: THE PERILS OF MODERN LIFE

Join Dr Suzy Lishman, President of the Royal College of Pathologists, as she performs a virtual autopsy on a live model to investigate the effects of modern living on the body. Discover what an autopsy involves and how post-mortem examinations have transformed our understanding of disease and why future investigations may not require a scalpel.

**6PM – 7PM** Pre-book  
→ **TUE 14 MAR**

Babbage Lecture Theatre,  
New Museums Site,  
Downing Street, CB2 3RS

All events  
are free  
unless  
otherwise  
stated

## TALKS

### GETTING TO THE HEART OF THINGS

How can your genes affect your risk of heart disease? Discover how public health scientists at Cambridge are working with blood donors to understand the links between genetics and disease, and to make blood donation safer and more productive.

**6PM – 7PM**

→ **TUE 14 MAR**

Mill Lane Lecture Rooms,  
Mill Lane, CB2 1RW

### SPACE ON EARTH

Professor Monica Grady, Open University, discusses how meteorites, fragments of asteroids, show us the processes and materials that shaped our solar system and planet.

Presented with  
Cambridge University Press

**6PM – 7PM**

Pre-book

→ **TUE 14 MAR**

Mill Lane Lecture Rooms,  
Mill Lane, CB2 1RW

### INSIDE OUT: HOW THE GUT CHANGES THE BRAIN'S VIEW OF THE WORLD

It is tempting to see the brain and gut as fulfilling different roles, one concerned with higher matters while the other does the dirty work: processing, absorbing and digesting the nutrients that we take in. Professors Fiona Gribble and Paul Fletcher challenge this view and show that close interactions between the brain and gut shape our eating behaviours.

**6.30PM – 9PM**

Pre-book

→ **TUE 14 MAR**

Cripps Court, Magdalene  
College, 1–3 Chesterton Road,  
CB4 3AD

### COME AND MEET OUR EPIC RESEARCHERS

Participants have provided the EPIC-Norfolk Study with a wealth of data regarding diet and lifestyle over the last 20+ years. How then to choose what to study and focus on? Join our researchers for a chat about their research over a cup of tea, discover what interests them and what they have found out.

**7PM – 8.30PM**

Pre-book

→ **TUE 14 MAR**

The Old Library, Darwin College,  
Newnham Terrace, CB3 9EX

### CREATIVITY AND CURIOSITY: ARTISTS AND ASTRONOMERS IN CONVERSATION

Ione Parkin, Alison Lochhead and Gillian McFarland are the three lead artists who produced the body of work for the exhibition, *Creativity and Curiosity*. With astronomers, they discuss their response to the science that inspired and shaped their work.

**7PM – 8.30PM**

→ **TUE 14 MAR**

Yusuf Hamied Centre,  
New Court, Christ's College,  
St Andrew's Street, CB2 3BU


### SCIBAR CAMBRIDGE

Join the British Science Association Cambridge Branch for a relaxed and informal science talk. A great opportunity to discover something new about science and technology while enjoying a drink.

**7PM – 8.30PM**

→ **TUE 14 MAR**

YHA Cambridge,  
97 Tenison Road, CB1 2DN



“An amazing opportunity to hear and see the world’s leading scientists bring science alive.”

2016 Festival attendee

### CLUELESS VOTING

Imagine that we are about to vote in a yes/no referendum. We hope that the majority will get the answer ‘right’. Unfortunately, each person is completely clueless about the answer. Professor Imre Leader considers what we should do.

Presented with  
Cambridge University Press

**7.30PM – 8.30PM**

Pre-book

→ **TUE 14 MAR**

Mill Lane Lecture Rooms,  
Mill Lane, CB2 1RW

### SENSING THE SEASON

Plants make key decisions such as when to grow and flower based in part on seasonal changes such as temperature and day length. But how do they measure the world around themselves to know when the time is right? We'll go on a molecular detective trail looking at some of the key players that plants in your garden use to mark the calendar.

**7.30PM – 8.30PM**

Pre-book

→ **TUE 14 MAR**

Sainsbury Laboratory,  
47 Bateman Street, CB2 1LR



# DO OUR GENES INFLUENCE OUR BEHAVIOURS?

**Dr John Perry**  
Senior Investigator Scientist,  
MRC Epidemiology Unit,  
University of Cambridge

Over the last 10 years I've been studying the genetic basis of human health and disease. We learn at school that most human traits are determined by both genes and the environment, and as a geneticist it's my job to explore this in more detail.

**SEE JOHN'S EVENT:**

Do our genes influence our behaviours?

**6PM – 7PM**

**WED 15 MAR**

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Most people are aware that genes play a role in diseases such as breast cancer and cystic fibrosis, though their role in other human traits and behaviours is less widely appreciated. For example, obesity and body shape are strongly influenced by our genes, a fact that seems counterintuitive in the modern fast food world. Perception of risk and decisions such as when to have children or whether to smoke may also seem purely responsive to social/environmental stimulus, yet these too have a genetic underpinning.

In my talk I will discuss studies which explore this, using examples from recent and ongoing research in Cambridge. I will also demonstrate how identifying the individual genes responsible for these traits can not only inform biology, but also drug development, risk prediction and public health strategy.



### WHAT WORKS FOR INDIA AND AFRICA CAN WORK FOR THE WORLD

Health is a global issue but the common view is that most medical innovation takes place in the West. Business expert Professor Jaideep Prabhu and bio-engineer Dr Dora Pereira challenge this view by discussing how solving medical challenges in resource-poor and pathogen-rich settings like India and sub-Saharan Africa is not just better for the people who live there but is also better for people living in other parts of the world.

Research Horizons Public Lecture

**7.30PM – 8.30PM** Pre-book  
→ **TUE 14 MAR**

Mill Lane Lecture Rooms,  
Mill Lane, CB2 1RW

### THE CIRCULAR ECONOMY: A CLIMATE CHANGE SOLUTION?

Explore the circular economy, a carbon reduction solution that is quickly gaining momentum, and how you might transform your own life, both individually and as part of a community, to address the challenges of climate change.

**7.30PM – 9.30PM** Pre-book  
→ **TUE 14 MAR**

Wesley Methodist Church,  
Christ Piece's, CB1 2NZ

↓ **Wed 15 Mar**

### RE-ANIMATING THE NAMELESS DEAD? ENCOUNTERING THE PEOPLE OF MEDIEVAL CAMBRIDGE

Where are the people who once walked the streets of medieval Cambridge? How can we rediscover them? How do we bridge the gap between a box of bones and encountering a human being? Professor John Robb discusses how we construct ancient biographies using scientific studies and humanistic narrative, based on 400+ medieval burials from St John's College.

**5PM – 6PM** Pre-book  
→ **WED 15 MAR**

St John's College Old Divinity School, All Saints' Passage, CB2 1TP

### ANATOMY AT THE CUTTING EDGE: DISSECTION-BASED TEACHING IN CAMBRIDGE THROUGH THE YEARS

Cadaveric dissection to 3D imaging: learn how anatomical education in Cambridge has developed over the centuries, from the establishment of the Anatomical School in 1716 to the 21st century. Dr Cecilia Brassett and Professor David Riches glimpse into the history of anatomy in Cambridge and share their vision for the future.

**6PM – 7PM**  
→ **WED 15 MAR**

Anatomy Lecture Theatre,  
Anatomy Building,  
Downing Site, CB2 3DY

### DO OUR GENES INFLUENCE OUR BEHAVIOURS?

The influence of our genes on health and disease is well recognised, but can they also influence other facets of our lives? Dr John Perry examines how recent genetic research suggests this may extend to regulating our personality and behaviours that predispose to obesity and other disorders.

**6PM – 7PM** Pre-book  
→ **WED 15 MAR**

Mill Lane Lecture Rooms,  
Mill Lane, CB2 1RW

### HACKING BIOLOGY THROUGH TIME AND SPACE

Join the Cambridge Biomakespace team and historian of science Dr Helen Anne Curry on a whirlwind global tour of biological engineering, from amateur efforts to use tools for genetic manipulation to current activities with do-it-yourself biologists, biohackers and citizen scientists across the world.

**6PM – 7PM** Pre-book  
→ **WED 15 MAR**

Department of Plant Sciences,  
Downing Site, CB2 3EA

### IS EARLIER NECESSARILY BETTER?

The issues surrounding earlier cancer detection are many and varied. Using excerpts from the BBC *Horizon* programme 'Are health tests really a good idea', we examine the use of cancer screening tests, and an invited panel of experts debates the subject with the audience.

**6PM – 7.30PM** Pre-book  
→ **WED 15 MAR**

McCrum Lecture Theatre,  
Corpus Christi College, Bene't Street, CB2 1RH

### MINI-ME: HOW 3D ORGANOIDS ARE REVOLUTIONISING RESEARCH

Petri dishes filled with beating hearts and firing neurons — it's the stuff of science fiction! Hear the real story from scientists growing 'miniature organs'. How is it done? Why is it important? Followed by wine, nibbles and the chance to chat with researchers. Co-hosted by Cambridge Stem Cell Institute, Wellcome Genome Campus, Gurdon Institute and Babraham Institute.

**6PM – 8PM** Pre-book  
→ **WED 15 MAR**

Buckingham House Lecture Theatre, Murray Edwards College, Huntingdon Road, CB3 0DF

### TACKLING CLIMATE CHANGE: WHOSE RESPONSIBILITY IS IT?

As we see ever more clearly the consequences of climate change, whose responsibility is it to tackle it? Professor Simon Redfern, Department of Earth Sciences, Craig Bennett, CEO Friends of the Earth, Dr Emily Shuckburgh, British Antarctic Survey, and Dr Julian Huppert, Jesus College, discuss whether it is down to individuals, companies or nations — or all three.

**7PM – 8.30PM** Pre-book  
→ **WED 15 MAR**

Webb Library, Jesus College, Jesus Lane, CB5 8BL

### FAMELAB CAMBRIDGE FINAL

FameLab returns again to Cambridge! Join our finalists as they talk about their research in just three minutes. No presentations, no props, just fascinating snippets of science.

Presented with TTP Group

**7PM – 9.30PM** Pre-book  
→ **WED 15 MAR**

Cambridge Junction, Clifton Way, CB1 7GX

### ↓ Thu 16 Mar

#### MEET THE SCIENTISTS

Are you considering becoming a scientist? Are you interested in finding out what it is really like to pursue a career in science? Join researchers in the Department of Pathology for a speed-meeting session to find out more.

**11AM – 12.30PM** Pre-book  
**1.15PM – 2:45PM**  
→ **THU 16 MAR**

Department of Pathology, Tennis Court Road, CB2 1QP

School groups aged 14–18

#### THE BONE COLLECTORS

Boris Jardine's project 'The Lost Museums of Cambridge Science, 1865–1936' tells the story of the New Museums Site in the centre of Cambridge, focusing on the way collections were amassed and then dispersed in the museums that once occupied the site. He speaks about the human aspects of the site development during Victorian times — a site that went on to house great museums and research.

**NOON – 1PM**  
→ **THU 16 MAR**

Whipple Museum of the History of Science, Free School Lane, CB2 3RH

### FAST FASHION: SLOWING IT DOWN

From materials to production, a holistic approach to fashion and why it's worth considering sustainability and social impact. Presented by Anglia Ruskin University.

**4PM – 5PM**  
→ **THU 16 MAR**

Anglia Ruskin University, East Road, CB1 1PT

### LOSING AND FINDING THE SELF IN THE BRAIN

Our personal identity depends on an intact brain. Dr Jane Aspell, Anglia Ruskin University, discusses how rare neurological and psychiatric disorders contribute to our understanding of the neuroscience of self.

**4PM – 5PM** Pre-book  
→ **THU 16 MAR**

Anglia Ruskin University, East Road, CB1 1PT

### SCIENCE FOR THE SUSTAINABLE DEVELOPMENT GOALS

Meet innovators in the Centre for Global Equality's Cultivator who are using cutting-edge Cambridge science and technology to help address the Sustainable Development Goals.

**4PM – 6PM** Pre-book  
→ **THU 16 MAR**

Centre for Global Equality, Emmanuel United Reformed Church, 72 Trumpington Street, CB2 1AA

**NOISY EMBRYOS: FROM THE BANE OF EMBRYOLOGY TO INDICATORS OF THE ANTHROPOCENE**

Linking Nick Hopwood's work on the history of variation in embryology to Simon Rundle's current use of embryos as indicators of climate change, this talk introduces *Noisy Embryos*, the audio-visual exhibition by Deborah Robinson and David Strang which responds to the uses of embryos in scientific research. Presented by Anglia Ruskin University.

**5PM – 6.30PM** Pre-book  
**6.30PM – 8PM**  
 → **THU 16 MAR**

Ruskin Gallery, Anglia Ruskin University, East Road, CB1 1PT

**BETTER ORGANS, BETTER OUTCOMES: WHAT ARE THE GOALS FOR CURRENT RESEARCH IN ORGAN DONATION AND TRANSPLANTATION?**

In the UK, over 6,500 people are currently on the waiting list for an organ transplant. In 2015/16, more transplants were carried out than ever before but there is still a gap between the number of patients waiting for a transplant and the number of organs available. Professor Mike Nicholson and colleagues discuss how their research may help increase the quality and quantity of organs for transplantation.

**6PM – 7PM** Pre-book  
 → **THU 16 MAR**

Mill Lane Lecture Rooms, Mill Lane, CB2 1RW

**FRANK KINGDON-WARD: TALES OF AN EXPLORER AND PLANT HUNTER**

Frank Kingdon-Ward has been described as 'the last of the great plant hunters; he discovered a staggering 23,000 plants over his 45-year career. Julian Doberski examines his life of exploration and his contribution to plant hunting and horticulture.

**6PM – 7PM**  
 → **THU 16 MAR**

Lloyd Room, Christ's College, St Andrew's Street, CB2 3BU

**GAIA: ONE BILLION PIXELS, ONE BILLION STARS, ONE AMAZING SATELLITE**

How big is the Milky Way? How old is it? What shape is it? Where are the stars? How fast do they move? Professor Gerry Gilmore answers some of these questions using measurements from the satellite Gaia at this sixth form lecture sponsored by The Institute of Physics and Cavendish Laboratory.

**6PM – 7PM**  
 → **THU 16 MAR**

Cavendish Laboratory, JJ Thomson Avenue, CB3 0HE

**THE GOOD, THE BAD AND THE UGLY: ANTIBODIES, MICROBES AND IMMUNITY**

Every day your immune system protects you from thousands of germs that can make you sick. It does its job so efficiently that you don't even notice that it is at work. Join Dr Maike De La Roche, Dr Eoin McKinney and Professor Clare Bryant to discover how your immune system has developed its own personal defence.

**6PM – 7.30PM** Pre-book  
 → **THU 16 MAR**

Mill Lane Lecture Rooms, Mill Lane, CB2 1RW

**BIOANALYSER SYSTEMS**

Engineering Consultant David Molony, formerly Technical Lead at TAP Biosystems, introduces the principles and detailed design and engineering of equipment that is used to analyse biological samples.

Presented with IET Cambridge Network

**6.30PM – 7.30PM** Pre-book  
 → **THU 16 MAR**

Department of Engineering, Trumpington Street, CB2 1PZ

**GETTING UP CLOSE AND PERSONAL IN HERCULANEUM: A STORY OF SEWERS AND CORPSES**

Join Professor Andrew Wallace-Hadrill on a journey through the Roman underbelly to find out about the personal and private lives of the people who lived, and died, in the exceptional site of Herculaneum.

**6.30PM – 7.30PM** Pre-book  
 → **THU 16 MAR**

Museum of Classical Archaeology, Sidgwick Avenue, CB3 9DA

**INGLORIOUS FRUIT AND VEG**

Around 40% of fruit and vegetables intended for human consumption are wasted in the UK because supermarkets don't want them. But what's wrong with a crooked carrot when you're hungry? A team of experts including a local farmer and a large supplier debate the issues. Presented by Cambridge Global Food Security Initiative, CambPlants Hub and Cambridge Forum for Sustainability and the Environment.

**6.30PM – 7.30PM**  
 → **THU 16 MAR**

Department of Plant Sciences, Downing Site, CB2 3EA

**CAMBRIDGE CLIMATE  
LECTURE SERIES:  
FROM COP21 TO ZERO  
GLOBAL EMISSIONS**

Join Lord Martin Rees, Professor Kevin Anderson and Oliver Morton of the *Economist* to discuss what changes we will need to make if we are to avoid climate chaos and meet the aspirations of the Paris Climate Agreement.

**6.30PM – 8PM** Pre-book  
→ **THU 16 MAR**

Lady Mitchell Hall, Sidgwick Avenue, CB3 9DA

↓ **Fri 17 Mar**

**THE FIRST NIGHT  
OF TELEVISION**

This is the 80th anniversary year of the first live BBC TV broadcast. The event was faithfully reconstructed for BBC4 by Dallas Campbell and engineers Hugh Hunt and Danielle George. Dr Hugh Hunt shares the story of John Logie Baird, his 'flying spot' camera and the curious cast of singers, jugglers and dancers who made up that first primitive night of television.

**5.30PM – 6.30PM** Pre-book  
→ **FRI 17 MAR**

Babbage Lecture Theatre,  
New Museums Site, Downing Street, CB2 3RS

Great for families

**EREBUS VOLCANO:  
IN THE FOOTSTEPS OF  
SHACKLETON AND SCOTT**

Professor Clive Oppenheimer explains what has been learned about how volcanoes work from observations of the southernmost active volcano, Mount Erebus on Ross Island, Antarctica. The island was the base for missions led by Shackleton and Scott. Their studies paved the way for subsequent investigations and the traces they left provide a tangible link between past and present scientific endeavours.

Presented with  
Cambridge University Press

**6PM – 7PM** Pre-book  
→ **FRI 17 MAR**

Mill Lane Lecture Rooms,  
Mill Lane, CB2 1RW

**WHY IS MY AI SO RACIST?  
THE PITFALLS OF DATA  
SETS, NEURAL NETWORKS  
AND TWITTER-BOTS**

Artificially intelligent systems are woven into our lives, used to predict crime statistics to speech patterns. They're powerful, flexible and fast but not without flaws: from an AI beauty contest that judged white features to be the most attractive, to unintended racial profiling by police camera software. So how do we get around this and how do we deal with the biased systems that already exist?

**7PM – 9PM**  
→ **FRI 17 MAR**

Keynes Hall, King's College,  
King's Parade, CB2 1ST

**WHO OWNS US?**

Explore the knotty and fascinating issues associated with the medical use of patient material such as tissue, cells and antibodies and patient data. Panelists George Freeman MP, Gareth Williams and others discuss the moral, economic, familial, legal, medical and ethical issues arising from the question 'Who owns us?'

Presented with  
Cambridge Enterprise

**7.30PM – 9PM** Pre-book  
→ **FRI 17 MAR**

Babbage Lecture Theatre,  
New Museums Site, Downing Street, CB2 3RS





# Meet the Mathematician Dr Katie Steckles

Science Communicator

People often think that mathematics is a very cold and (literally) calculating subject, with little creativity or imagination involved - and are sometimes surprised when they hear a mathematician describe something within mathematics as being beautiful. I can understand this response, but I also know that sometimes things in maths can be so perfect, so abstract and satisfying that they have their own beauty - and sometimes, mathematical objects do actually look like a beautiful piece of art.

I'll be coming down to the Cambridge Science Festival in March to talk about fractals - these are highly detailed, complex mathematical structures, made by repeating simple steps to infinity. They come in all shapes and sizes, but they often look like beautiful intricate lace patterns, or spidery twisty constructions which can be breathtaking. Zooming in closer allows you to see even more of their infinite beauty, and within the structure of the fractal this detail is often repeated, echoing off into forever.

I love playing around with fractals and investigating the complex ways they're formed, and in my talk I'll explore some of my favourite examples, show how the mathematics behind fractals can be used in other ways to understand the world, and I'll even bring some fractals along so you can take one home. And remember, if you hear someone tell you that something they're interested in is beautiful, or fascinating, or amazing - think twice before dismissing it, and maybe take a minute to see if you can find the beauty in it too.



## SEE KATIE'S EVENT:

Fractals: never ending intricate mathematical patterns

**2PM – 3PM**  
**SAT 18 MAR**  
**PAGE 19**

## ↓ Sat 18 Mar

### CHAOS TALKS AT CRASH, BANG, SQUELCH

Discover all sorts of weird and wonderful science from our CHaOS student volunteers.

#### 10AM – 10.30AM

Spectacular seeds, with Sonja Dunbar and Sarah Wiseman

#### 11AM – 11.30AM

Asteroids and meteorites: the rocks that killed off the dinosaurs? with Roxanne Armfield

#### NOON – 12.30PM

Maths, games and being nice, with Tom Webster

#### 12.45PM – 1.15PM

Parasites: the force within, with Arporn Wangiwatsin

#### 1.30PM – 2PM

Where are all the aliens? with Andrew Sellek and Lucy Oswald

#### 2.15PM – 2.45PM

Geologise! The time machine, with Matthew Kemp and Roberta Wilkinson

#### 3.15 – 3.45PM

Feeding the flame, with Tim Boyd

#### 4.15PM – 4.45PM

Super sensors: going beyond the five senses in the animal kingdom, with Hannah Thorne

#### 10AM – 4.45PM Pre-book

→ SAT 18 MAR

Department of Zoology,  
New Museums Site,  
Downing Street, CB2 3EJ

Timed tickets available in advance with some drop-in tickets available on the day

Great for families

### ALAN TURING AND THE ENIGMA MACHINE

Can we build a machine that can solve any problem? How can we break a code others believe unbreakable? Why do leopards have spots and zebras stripes? These questions were all answered by Alan Turing. Mathematician James Grime explores Turing's childhood fascination with maths and how it led to the breaking of the infamous Enigma cipher. Including a demonstration of an original WWII Enigma machine!

#### 10.30AM – 11.30AM Pre-book

→ SAT 18 MAR

Babbage Lecture Theatre,  
New Museums Site,  
Downing Street, CB2 3RS

Ideal for teenagers

### THE RE-BIRTH OF ANATOMICAL ART

Anatomist and artist Emily Evans discusses the rise of the use of anatomy in contemporary art and popular culture.

#### 10.30AM – 11.30AM

→ SAT 18 MAR

Anatomy Lecture Theatre,  
Anatomy Building, Downing  
Site, CB2 3DY

### BURNING ISSUES: FIRE AND FLAMES

Dr Peter Wothers investigates the process of combustion — why some things burn quietly but others explode violently. Discover why water doesn't burn but some compounds spontaneously burst into flames. Find out how a simple equation can help us achieve an even bigger bang. Warning: LOUD BANGS!

Supported by the Walters Kundert Charitable Trust

#### 11AM – NOON Pre-book

1.30PM – 2.30PM

4PM – 5PM

→ SAT 18 MAR

2PM – 3PM

→ SUN 19 MAR

7PM – 8PM

→ MON 20 MAR

BMS Lecture Theatre,  
Department of Chemistry,  
Lensfield Road, CB2 1EW

Great for families

### FEELING THE TOUCH OR PAIN OF OTHERS

When you see someone being touched, do you feel as if you are the one being touched? Do you literally 'feel the pain of others'? If you do, you are not alone. Take our survey and find out more about mirror-touch and mirror-pain synaesthesia with Dr Idalmis Santiesteban.

#### 11AM – NOON Pre-book

→ SAT 18 MAR

Department of Psychology,  
Downing Site, CB2 3EB

## TALKS

### UNDERSTANDING AUTISM

What has research revealed about the causes of autism and potential treatment? Dr Susanna Mierau provides an introduction to how these questions are being addressed in the clinic and in the laboratory.

**NOON – 1PM**

→ **SAT 18 MAR**

Physiology Lecture Theatre,  
Physiological Laboratory,  
Downing Site, CB2 3EG

### COMPOUND INTEREST: CHEMISTRY IN THE KITCHEN

Chemistry doesn't have to be done in a lab; in fact, you can do it in your kitchen! Find out with Andy Brunning, the chemistry lurking in your kitchen cupboards, and learn some chemical explanations for food oddities along the way.

**12.15PM – 1.15PM** Pre-book

→ **SAT 18 MAR**

Babbage Lecture Theatre,  
New Museums Site, Downing  
Street, CB2 3RS

Great for families

### ARE YOU THE MASTER OF YOUR IMPULSES?

We tend to think that we know ourselves and the very nature of our impulses, what drives our choices and actions. Is this really the case? David Belin discusses how our impulses drive our emotions and behaviour and how these may contribute to deficits in decision making, impulsivity and even addiction.

**12.30PM – 1.30PM**

→ **SAT 18 MAR**

Anatomy Lecture Theatre,  
Anatomy Building,  
Downing Site, CB2 3DY

### CONNECTA: BRINGING TOGETHER FAMILIES AND TEACHERS OF INDIVIDUALS WITH AUTISM

The Cambridge Laboratory for Research into Autism aims to apply its research to enhance the lives of children and adults with autism. We invite families and teachers of individuals with autism to a talk by Dr Kate Plaisted-Grant presenting some of her lab's latest findings.

**2PM – 3PM**

Pre-book

→ **SAT 18 MAR**

Nick Mackintosh Seminar Room,  
Department of Psychology,  
Downing Site, CB2 3EB

### FRACTALS: NEVER ENDING INTRICATE MATHEMATICAL PATTERNS

Mathematician Katie Steckles shows us the beauty of fractals, exploring these intriguing structures and explaining why she finds them so fascinating. From constructing simple fractal shapes to her worldwide MegaMenger project, Katie demonstrates why fractals captured her mathematical imagination and why she finds magnificence in their infinity.

**2PM – 3PM**

Pre-book

→ **SAT 18 MAR**

Babbage Lecture Theatre, New  
Museums Site, Downing Street,  
CB2 3RS

Ideal for teenagers

### SOCIAL CONSENSUS: HOW CAN SOCIAL PSYCHOLOGY INFORM SOCIETY'S BIGGEST CHALLENGES?

How does social consensus around key societal issues emerge? Why do some social causes go viral but not others? We explore how research from social psychology informs some of society's biggest challenges, from climate change and Brexit to public health and poverty.

**2PM – 3PM**

→ **SAT 18 MAR**

Anatomy Lecture Theatre,  
Anatomy Building, Downing Site,  
CB2 3DY

### TECHNOLOGY AND THE EVOLUTION OF THE PERSONAL

The introduction of novel technologies, especially those that intrude into our relationships, often results in outcomes that are different to what was intended. How can psychology help us understand why this is so and what is in prospect for the future of recent innovations?

**2PM – 3PM**

→ **SAT 18 MAR**

Psychology Lecture Theatre,  
Department of Psychology,  
Downing Site, CB2 3EB

### TREAD SOFTLY BECAUSE YOU TREAD ON MY DATA

Adrien Arculeo, Chartered Engineer from France, MIT and Stanford Ignite, evaluates how data is used by Google, Apple, Facebook, Amazon and others, and asks what can or should we do as citizens and consumers?

**2PM – 3PM**

Pre-book

→ **SAT 18 MAR**

Alliance Française,  
60 Hills Road, CB2 1LA



**CONSERVATION  
CONFIDENTIAL: DOWN  
THE MICROSCOPE  
AND IN THE STUDIO**

Find out how conservators study the life stories and secrets of artworks. From mummies to Michelangelo drawings, see how we image, analyse and probe. A very personal encounter with our collections!

**2PM – 4PM** Pre-book  
→ **SAT 18 MAR**

Fitzwilliam Museum,  
Trumpington Street, CB2 1RB

**BUILDING BABIES: THE  
KEY TO LIFE-LONG HEALTH**

How does our development in the womb affect our health as an adult? Professor Graham Burton explores how new insights into the placenta offer a fresh approach to addressing chronic disease in adult life.

**2.30PM – 3PM**  
→ **SAT 18 MAR**

Physiology Lecture Theatre,  
Physiological Laboratory,  
CB2 3EG

**ZITS, SEX, DRUGS AND  
ROCK 'N' ROLL: ALL  
HUMAN LIFE IS HERE**

Often dismissed as an unpleasant transitional stage or even maligned as a blight on society, are teenagers really unproductive and worthless? Dr David Bainbridge uses anthropology, physiology, history and psychology to argue that the teenage years should instead be seen as a unique human innovation – the very phenomenon, in fact, which has allowed us to achieve our unique success.

**3.45PM – 4.45PM** Pre-book  
→ **SAT 18 MAR**

Babbage Lecture Theatre,  
New Museums Site,  
Downing Street, CB2 3RS

Ideal for teenagers

**OPTIMISTIC SHOW AND TELL**

Celebrate what keeps us hopeful for the future with punchy presentations by some of the best speakers from the Cambridge Conservation Initiative, the Museum of Zoology and beyond – as they tell us why it's not all doom and gloom for the planet and why we're celebrating #EarthOptimism on the 22nd April 2017.

**4PM – 6PM**  
→ **SAT 18 MAR**

David Attenborough Building,  
New Museums Site,  
Downing Street, CB2 3QZ

↓ **Sun 19 Mar**

**HOW THE BRAIN BEGAN**

The human brain is one of the most remarkable objects in the known Universe but, like every living thing, it evolved over millions of years from the humblest of beginnings. Join zoologist and writer Matt Wilkinson on a quest to uncover these mysterious origins. You'll never look at a sponge in the same way again!

**11AM – NOON** Pre-book  
→ **SUN 19 MAR**

Babbage Lecture Theatre,  
New Museums Site,  
Downing Street, CB2 3RS

Great for families

**THE WONDERS OF WHALES**

Animals with backbones took millions of years to move out of the seas and onto land, then one group turned around and dived back in. Join Helen Scales for an encounter with whales, including the biggest and some of the smartest animals ever to evolve.

**12.45PM – 1.45PM** Pre-book  
→ **SUN 19 MAR**

Babbage Lecture Theatre,  
New Museums Site,  
Downing Street, CB2 3RS

Ideal for teenagers

**There is  
no need to  
pre-book  
events unless  
specifically  
stated**

To pre-book, visit:  
[www.sciencefestival.cam.ac.uk](http://www.sciencefestival.cam.ac.uk)  
or call: 01223 766766

**MORE BRAIN POKING**

Steve Mould is well known for pulling pranks on people in BBC1's *Britain's Brightest*, all in the name of science. He explores the mysteries of the brain by messing with your senses. Discover how tricking your perception of reality can unlock the secrets of the mind. A few years ago Steve brought Poking the Brain to the Festival. He returns with exciting new demonstrations and audience experiments.

**2.30PM – 3.30PM** Pre-book  
→ **SUN 19 MAR**

Babbage Lecture Theatre,  
New Museums Site,  
Downing Street, CB2 3RS

Great for families

**MY GERMS: FRIEND OR FOE?**

Explore the hidden world of germs. Marvel at the magnificent range of germs that live upon us. Discover how some keep us well and some make us ill.

**2.30PM – 3.30PM** Pre-book  
→ **SUN 19 MAR**

Institute of Continuing Education,  
Madingley Hall, Madingley,  
CB23 8AQ

**THE FULL-SPECTRUM SCIENCE SHOW**

From laser light displays to extreme X-rays, we'll take you on a fantastic journey through the rainbow world of the electromagnetic spectrum. You'll believe your eyes — but you shouldn't in this illuminating science show. Jon London is the presenter, so SOMETHING is sure to catch on fire!

**4PM – 5PM** Pre-book  
→ **SUN 19 MAR**

Babbage Lecture Theatre,  
New Museums Site,  
Downing Street, CB2 3RS

Great for families

**THE PSYCHOLOGY AND NEUROSCIENCE OF POLITICAL PREFERENCES**

Research has revealed a surprising range of individual differences between people who identify as left or right wing — from the size or activity of particular areas of the brain, to moral values, to biases in categorising. Perhaps these findings can help us to understand the perspective of those who identify as being on the left or the right?

**4PM – 5PM** Pre-book  
→ **SUN 19 MAR**

Institute of Continuing Education,  
Madingley Hall, Madingley,  
CB23 8AQ

**SCIENCE FESTIVAL CHORAL EVENSONG**

A traditional service of Choral Evensong according to the *Book of Common Prayer* (1662) in the University Church, with a visiting preacher.

**5.30PM – 6.30PM**  
→ **SUN 19 MAR**

University Church,  
Great St Mary's,  
Senate House Hill, CB2 3PQ

Voluntary collection

↓ **Mon 20 Mar**

**EXPERIMENTS IN PHOTOGRAPHY: CAMBRIDGE IN THE 30S**

Discover the pioneering experimental work, including the techniques of solarisation, rayographs and multiple exposures, of two women photographers practising in Cambridge in the 1930s under the name of Ramsey & Muspratt.

**5.30PM – 6.30PM** Pre-book  
→ **MON 20 MAR**

Milstein Room,  
Cambridge University Library,  
West Road, CB3 9DR

**LIFE LESSONS FROM THE NAKED MOLE-RAT: PAIN AND MUCH, MUCH MORE**

Acute pain is an unpleasant sensation that everyone experiences, but is necessary for our survival. By contrast, chronic pain often serves no purpose. To treat chronic pain we need to understand its biological basis. Dr Ewan St John Smith shows how studying the naked mole-rat has unlocked secrets about pain and much, much more.

**6PM – 7PM** Pre-book  
→ **MON 20 MAR**

Mill Lane Lecture Rooms,  
Mill Lane, CB2 1RW

**LIFE THROUGH A LENS**

Dr Brad Amos, MRC Laboratory of Molecular Biology, has helped develop a new lens that achieves unparalleled resolution throughout a volume hundreds of times greater than a conventional microscope. Here he shows spectacular new 3D images, which reveal subcellular detail in every one of the millions of cells in an intact mouse embryo.

**6PM – 7PM** Pre-book  
→ **MON 20 MAR**

UTC Cambridge,  
Robinson Way, CB2 0SZ

Ideal for teenagers

**MEET YOUR FRIENDLY NEIGHBOURHOOD CLIMATE SCIENTISTS**

Cambridge Centre for Climate Science invites you to join some of your local experts for an evening of short science talks, followed by a question-and-answer session. Come and get personal with climate science!

**6PM – 7.30PM** Pre-book  
→ **MON 20 MAR**

Mill Lane Lecture Rooms,  
Mill Lane, CB2 1RW





## Meet the Professor Barbara Sahakian

Professor of Clinical Neuropsychology, University of Cambridge

We all know that sport is good for developing teamwork and exercise is good for your cognition, mood and physical health. However, recently in films such as *Concussion* and in the media there has been much concern over the prevalence of concussions and brain injuries and their effects on cognition and health in the process of playing professional sports, including rugby, boxing, NFL football and motor racing. Despite this interest, the scientific basis underlying sports related head injuries is incomplete.

Studies into the cognitive and emotional effects of brain injury acquired from a variety of sources have found that survivors of head injury show a diverse pattern of psychiatric and cognitive profiles, including deficits in attention, learning and memory, as well as slowed processing speed. Yet the constant pressure to perform means that players rarely seek help. It is increasingly being recognised that more needs to be done to ensure the brain health and wellbeing of players, including improving their cognitive deficits.

Using novel innovative technologies, we can improve functioning, quality of life and wellbeing of players. For instance, the recent development of gamified cognitive training using 'serious' games on mobile phones and tablet devices represents a new and exciting option for delivering targeted cognitive training. Combining advanced neuroimaging and neuropsychological techniques could also help improve our understanding of repetitive brain injury during sport, such as in boxing. Imaging could be used to improve the safety of players if it detects early signs of brain injury.

At this year's Science Festival join us in a discussion of the benefits and risks of sport and how novel technologies can help to improve the brain health and wellbeing of players.



### SEE BARBARA'S EVENT:

Sport is good for exercise and teamwork but what about your brain?

**6PM – 7.30PM**

**FRI 24 MAR**

**PAGE 27**

**WHAT CAN WE LEARN ABOUT DEMENTIA FROM RESEARCH WITH COMMUNITIES?**

Professor Carol Brayne has been leading community-based studies of older people for 30 years. In this presentation, she touches on what these studies are and how they contribute to our understanding of dementia.

**7.30PM – 8.30PM** Pre-book  
→ **MON 20 MAR**

Mill Lane Lecture Rooms,  
Mill Lane, CB2 1RW

**TOWARDS GENERAL ARTIFICIAL INTELLIGENCE**

Demis Hassabis, co-founder and CEO of DeepMind, discusses what is happening at the cutting edge of AI, including the recent historic AlphaGo match, and its potential impact on science and healthcare and our understanding of the human mind.

Cambridge Society for the  
Application of Research  
Public Lecture

**7.30PM – 9PM**  
→ **MON 20 MAR**

Wolfson Lecture Theatre,  
Churchill College, Storey's Way,  
CB3 0DS

£3 / free to students and CSAR  
members, includes refreshments

↓ **Tue 21 Mar****BEATING MULTIPLE SCLEROSIS AND HELPING THE BRAIN REPAIR ITSELF**

Joined by Professor Alasdair Coles, people with multiple sclerosis (MS) explain how they are affected by this inflammatory disease of the brain and spinal cord. In 1993, the first drug to suppress the inflammation in MS became available and several increasingly effective treatments have been developed since. They describe how the first battle in the war against MS has nearly been won.

Cambridge Neuroscience  
Public Lecture

**6PM – 7PM**  
→ **TUE 21 MAR**

Robinson College,  
Grange Road, CB3 9AN

**CIRCADIAN CLOCKS: SECRETS OF YOUR BODY'S INNER TIMERS**

In the competition to survive and pass on genetic information, plants and animals that are able to anticipate day and night, winter and summer come out best. This led to the evolution of 'body clocks'. Dr Michael Hastings describes the genetic, cellular and neurobiological mechanisms that drive these clocks and how the disturbance of our inner clockwork is a serious threat to our health and well being.

**6PM – 7PM** Pre-book  
→ **TUE 21 MAR**

Babbage Lecture Theatre,  
New Museums Site, Downing  
Street, CB2 3RS

**EXPLORING THE TEENAGE BRAIN**

Dr Kirstie Whitaker takes you on a journey 'under the hood' to learn how researchers in Cambridge and around the world are studying the teenage brain. She discusses what we can, and can not, learn from the use of brain scans to understand this sensitive period of brain development.

**6PM – 7PM** Pre-book  
→ **TUE 21 MAR**

Mill Lane Lecture Rooms,  
Mill Lane, CB2 1RW

**OUR DYNAMIC SUN**

The Sun, our star, has just passed the peak of its activity cycle. Dr Helen Mason reviews what we have learnt from solar space observatories about our dynamic Sun, what we know (and don't yet know!) about sunspots, solar active regions and flares, and how the Sun affects the Earth's environment.

**6PM – 7PM** Pre-book  
→ **TUE 21 MAR**

UTC Cambridge,  
Robinson Way, CB2 0SZ

Ideal for teenagers

**EPIGENETICS: DNA DOES NOT ACCOUNT FOR EVERYTHING**

The same script can result in many different productions of a play. Increasingly, we are coming to understand DNA in the same way. Find out what we are learning about the world beyond DNA and what remains to be discovered. Followed by wine and nibbles and the chance to chat with researchers. Co-hosted by the Cambridge Stem Cell Institute, Wellcome Genome Campus, Gurdon Institute and Babraham Institute.

**6PM – 8PM** Pre-book  
→ **TUE 21 MAR**

Buckingham House Lecture  
Theatre, Murray Edwards  
College, Huntingdon Road,  
CB3 0DF

**100,000 GENOMES:  
THE ROAD TO PERSONALISED  
GENOMIC MEDICINE**

A technology breakthrough that started in Cambridge has brought us to where we are able to decode the entire DNA sequence of 100,000 genomes to determine mutations that cause rare genetic diseases and cancer. Dr David Bentley, Chief Scientist at illumina, and Professor Mark Caulfield, Chief Scientist at Genomics England, discuss how this promises to revolutionise the way we practise medicine.

Presented with illumina

**7.30PM – 8.30PM** Pre-book  
→ **TUE 21 MAR**

Babbage Lecture Theatre,  
New Museums Site,  
Downing Street, CB2 3RS

**MORPHING STRUCTURES**

Morphing structures can adapt their shape to suit their environment and purpose. They are surprisingly difficult for us to make, but nature offers many solutions. For example, the Venus flytrap captures its prey using an ingenious morphing structure. Martin Walker introduces examples of these morphing structures: discover how they work and try them for yourself.

**7.30PM – 8.30PM** Pre-book  
→ **TUE 21 MAR**

Mill Lane Lecture Rooms,  
Mill Lane, CB2 1RW

↓ **Wed 22 Mar**

**LOOKING BENEATH THE SOIL**

Dr Alessandro Launaro and Professor Martin Millett, Faculty of Classics, discuss how the use of ground-penetrating radar is providing key new evidence about Roman towns in Italy. With new approaches to the collection and analysis of data, it is now possible to map the sub-surface archaeology of entire settlements.

**6PM – 7PM** Pre-book  
→ **WED 22 MAR**

Mill Lane Lecture Rooms,  
Mill Lane, CB2 1RW

**ODD BEHAVIOUR,  
STRANGE IDEAS AND  
THE IMMUNE SYSTEM**

In 2009, doctors in Cambridge discovered that a small proportion of people with psychosis have antibodies in their blood which bind to brain proteins. If they are treated with drugs to eliminate these antibodies, psychosis improves. Professor Alasdair Coles, scientists and people affected by psychosis discuss the implications of this understanding of how the immune system affects our behaviour and thoughts.

**6PM – 7PM** Pre-book  
→ **WED 22 MAR**

Mill Lane Lecture Rooms,  
Mill Lane, CB2 1RW

**SEDGWICK SNAPSHOTS**

Enjoy an evening of short talks about our amazing collection at the Sedgwick Museum of Earth Sciences and explore the galleries by twilight. Join our experts as they cover climate change, Charles Darwin's adventures on HMS *Beagle* and even a 17th century fossil collection.

**6PM – 7.30PM** Pre-book  
→ **WED 22 MAR**

Sedgwick Museum of Earth  
Sciences, Downing Site,  
CB2 3EQ

**All events  
are free  
unless  
otherwise  
stated**



**LOOK WHAT CHEMISTRY HAS DONE FOR ME**

Students, teachers and adults are all welcome to this event organised by the Royal Society of Chemistry. Join us for short talks from chemists working in industry and academia to give you an insight into career opportunities in chemistry.

**6.30PM – 8.30PM** Pre-book  
→ **WED 22 MAR**

UTC Cambridge,  
Robinson Way, CB2 0SZ

Ideal for teenagers

**LIVING WELL WITH PSYCHOSIS**

We all want wellbeing, but what does this mean for someone with a diagnosis of schizophrenia? Join Professor Mike Slade, University of Nottingham, to discover how wellbeing research has implications for mental health systems, and how lessons from research into mental health recovery can change our world.

Presented with  
Cambridge University Press

**7.30PM – 8.30PM** Pre-book  
→ **WED 22 MAR**

Mill Lane Lecture Rooms,  
Mill Lane, CB2 1RW

↓ **Thu 23 Mar**

**WHEN STRESS LEADS TO DIZZINESS AND FAINTING**

Why do we sometimes experience decreases in physiological arousal when stressed? Dr Philippe Gilchrist discusses whether this is a biological accident or evolutionarily adaptive. And what are the mechanisms? And how can it be managed?

**5PM – 6PM**  
→ **THU 23 MAR**

Department of Psychology,  
Downing Site, CB2 3EB

**TEST TUBES AND YOUTUBE: COMMUNICATING SCIENCE THROUGH FILM**

Join researchers from the Gurdon Institute, academics, students and graduates from the Cambridge School of Art, and filmmakers from brandAnonymous to discuss how film can be used to share and promote scientific research. Presented with Anglia Ruskin University.

**5PM – 7PM** Pre-book  
→ **THU 23 MAR**

Anglia Ruskin University,  
East Road, CB1 1PT

**ANNUAL DISABILITY LECTURE: CREATING A MORE INCLUSIVE WORLD**

This talk explores the impact of accessible and assistive technology in higher education and how it aims to create a more inclusive world. It focuses on existing technologies and also highlights technology of the future such as the Seeing AI project.

**5.30PM – 6.30PM** Pre-book  
→ **THU 23 MAR**

St John's College Fisher  
Building, St John's Street,  
CB2 1TP

**FINDING THE FOUNTAIN OF YOUTH: WHY WE AGE AND WHAT WE CAN DO ABOUT IT**

Why the ageing process occurs and how it leads to diseases that affect the elderly are questions that have occupied scientists and philosophers for centuries. Dr Rebecca Taylor explains how tiny worms reveal how the nervous system coordinates the ageing process and how it controls the health of cells as we get older.

**6PM – 7PM** Pre-book  
→ **THU 23 MAR**

UTC Cambridge,  
Robinson Way, CB2 0SZ

Ideal for teenagers

**IN THE PINK: WHY PENGUIN POO IS EXTREMELY INTERESTING**

Dr Gareth Rees is part of a team from the Scott Polar Research Institute and the British Antarctic Survey, that are developing new ways of counting penguins from space. He explains how, where and why they became world experts in the colour of penguin poo, and what this might tell us about climate change.

**6PM – 7PM** Pre-book  
→ **THU 23 MAR**

The Polar Museum,  
Lensfield Road, CB2 1ER

**PARENTS AS PARTNERS IN RESEARCH**

Professor Lucy Raymond discusses the IMAGINE ID study which harnesses parental expertise at scale to understand the long-term effects of genetics, intellectual disability and mental health in children.

**6PM – 7.30PM** Pre-book  
→ **THU 23 MAR**

Mill Lane Lecture Rooms,  
Mill Lane, CB2 1RW

**WHAT MAKES YOU, YOU: STORIES OF GENETICS AND HUMAN IDENTITY**

How does genetics relate to who 'we' are, as an individual, as a family and as a society? Social scientist Jonathan Roberts explores how films and books can help us think about our identity as we enter the genomic age.

**6PM – 7.30PM** Pre-book  
→ **THU 23 MAR**

McCrum Lecture Theatre,  
Corpus Christi College,  
Bene't Street, CB2 1RH

## IN CONVERSATION WITH THE BABRAHAM INSTITUTE

Join us for an evening of informal discussions with researchers from the Babraham Institute and find out how they are trying to understand healthy ageing at the cell and molecular level. They are keen to step outside the laboratory and listen to your ideas, so why not drop by and have a drink and a chat!

**6.30PM – 8PM** Pre-book  
→ **THU 23 MAR**

The Michaelhouse Café,  
Trinity Street, CB2 1SU

## THE HUNT FOR DEMENTIA

There are 850,000 people living with dementia in the UK, and more than 8,000 in Cambridgeshire alone. Because no treatments exist, there is a desperate need to find new ways to help people living with the condition. Take a tour of the Alzheimer's Research UK Cambridge Drug Discovery Institute, find out more about dementia and the latest research, and put your questions to the experts.

**6.30PM – 8PM** Pre-book  
→ **THU 23 MAR**

Clifford Allbutt Building,  
Hills Road, Cambridge,  
CB2 0SP

## CYCLING SCIENCE

Dr Dan Gordon, Anglia Ruskin University is a Paralympian and world record holder. He discusses his experience supporting athletes in sports including track and field, cycling, football and rugby, and the importance of personalised training, eating and competing.

**7PM – 8PM** Pre-book  
→ **THU 23 MAR**

Anglia Ruskin University,  
Young Street, CB1 2LZ

## REPROGRAMMING LIFE WITH SYNTHETIC BIOLOGY

Synthetic biology takes an engineering approach to the design of biological systems and is shaping the future of our bio-economy. Chaired by Tim Radford, Professor Jim Haseloff, Professor Alison Smith, Dr Rob Doubleday and colleagues discuss the implications of reprogramming organisms for use in agriculture health and biofuels, and for contributing to our fundamental understanding of biology.

Presented with Science AAAS

**7.30PM – 9PM** Pre-book  
→ **THU 23 MAR**

St John's College Old Divinity  
School, All Saints' Passage,  
CB2 1TP

↓ **Fri 24 Mar**

## NEW HORIZONS IN ROBOTICS

Join us for a one-day programme of talks under the auspices of the Cambridge Philosophical Society, Cambridge's oldest scientific society. Topics under discussion will range from robotics applications and biologically inspired robots to robot ethics and consciousness. For timings and a full speaker list, visit: [cambridgephilosophicalsociety.org](http://cambridgephilosophicalsociety.org)

**10AM – 4PM**  
→ **FRI 24 MAR**

Department of Engineering,  
Trumpington Street, CB2 1PZ

## ALEX HOPKINS LECTURE: THE SKULL, A MULTITUDE OF FORMS

Why do animals have different shaped skulls? Dr Phil Cox introduces us to some of the weird and wonderful skulls that are found in the animal kingdom, including the very strange domed, flat-faced skull of humans, and shows why such an incredible diversity of forms has evolved.

**5PM – 6PM** Pre-book  
→ **FRI 24 MAR**

BMS Lecture Theatre,  
Department of Chemistry,  
Lensfield Road, CB2 1EW

Great for families

## GAIA'S FIRST DATA RELEASE: THE GALACTIC CENSUS BEGINS

The Gaia satellite, launched in December 2013, will provide the first six-dimensional census of the Milky Way using a billion-pixel video camera. It will determine basic astrophysical properties for one billion stars, test general relativity, and provide the first robust distance scale in cosmology. Professor Gerry Gilmore outlines what the first data release shows.

Presented with RSC / SCI

**6PM – 7PM** Pre-book  
→ **FRI 24 MAR**

Mill Lane Lecture Rooms,  
Mill Lane, CB2 1RW

**THE MATHS OF EVERYDAY OBJECTS**

Using playing cards, bouncing balls, a newspaper, the back of an envelope and a pair of socks, Rob Eastaway and Dr Hugh Hunt take a fun look at the fascinating hidden mathematics to be found in even the most mundane of household objects.

**6PM – 7PM** Pre-book  
→ **FRI 24 MAR**

UTC Cambridge,  
Robinson Way, CB2 0SZ

Ideal for teenagers

**SPORT IS GOOD FOR EXERCISE AND TEAMWORK BUT WHAT ABOUT YOUR BRAIN?**

We know that sport is good for developing teamwork and exercise is good for your cognition, mood and physical health. However, we also hear about the negative effects of football, boxing and other sports on the brain. Join Professor Barbara Sahakian, Professor Peter Hutchinson, Dr Michael Hart and Dr George Savulich in a discussion of the benefits and risks of sports.

Presented with  
NIHR Brain Injury HTC

**6PM – 7.30PM** Pre-book  
→ **FRI 24 MAR**

Mill Lane Lecture Rooms,  
Mill Lane, CB2 1RW

↓ **Sat 25 Mar****ROSALIND AND DOROTHY AT NEWNHAM: ICONIC FEMALE SCIENTISTS**

A celebration of the lives and scientific contributions of Rosalind Franklin and Dorothy Hodgkin, crystallographers and iconic female scientists, through a series of talks. More information online.

**10AM – 4PM** Pre-book  
→ **SAT 25 MAR**

The Old Labs, Newnham  
College, Sidgwick Avenue,  
CB3 9DF

**COME FLY WITH US: A TOUR OF JET ENGINE MATERIALS**

The jet engine is a tough engineering environment and needs to run at very high temperatures and high speeds yet remain lightweight. Discover the superstrong materials used to make an aircraft jet engine and what the future holds for jet engineering.

**10.10AM – 11AM**  
→ **SAT 25 MAR**

Department of Materials  
Science and Metallurgy,  
Charles Babbage Road,  
CB3 0FS

**THE SCIENCE OF ICE CREAM**

Ever wondered why ice cream is so delicious? Researchers from the Department of Materials Science and Metallurgy explore the material properties of the world's favourite dessert and make 60 litres live using the cooling power of liquid nitrogen!

**10.30AM – 11.30AM** Pre-book  
**NOON – 1PM**  
→ **SAT 25 MAR**

University of Cambridge Sports  
Centre, Philippa Fawcett Drive,  
CB3 0AS

Great for families

**POLAR DATA INTO ART**

Discover how art can unlock the significance and excitement of data from polar research by joining us for a series of talks by artists and polar scientists in British Antarctic Survey's new Aurora Innovation Centre.

**11AM – NOON** Pre-book  
→ **SAT 25 MAR**

British Antarctic Survey,  
High Cross, Madingley Road,  
CB3 0ET

**WHERE MATHS COLLIDES WITH HOLOGRAMS AND SPECIAL EFFECTS**

Emmy-winning computer scientist Dr Andrew Fitzgibbon, Principal Scientist at Microsoft, talks about the cool maths tricks and techniques he has used for his work on films like *Harry Potter*, for Xbox and in Microsoft's latest gadget, the HoloLens, the first fully self-contained, holographic computer.

**11AM – NOON** Pre-book  
→ **SAT 25 MAR**

Isaac Newton Institute  
for Mathematical Sciences,  
20 Clarkson Road, CB3 0EH

Ideal for teenagers

**FROM NATURE TO SYNTHESIS AND BACK AGAIN: THE ROLE OF MATERIALS IN MEDICAL IMPLANTS**

Ever wondered which materials are used in medical implants? Want to know how prostheses and implants have developed over time? Discover the history of the materials that are used for medical applications and the possibilities for implants and prostheses in the future.

**11.15AM – 12.15PM**  
→ **SAT 25 MAR**

Department of Materials  
Science and Metallurgy,  
Charles Babbage Road,  
CB3 0FS

### **NANOGENERATORS: SMALL POWER, BIG IMPACT**

Harvesting energy from ambient sources, such as vibrations and waste heat, offers a clean and competitive alternative to batteries. Discover how nanomaterials for energy harvesting can be made into devices that can convert motion and heat into electricity.

**12.30PM – 1.30PM**

→ **SAT 25 MAR**

Department of Materials  
Science and Metallurgy,  
Charles Babbage Road,  
CB3 0FS

### **CAVENDISH LABORATORY PHYSICS TALKS**

Dr Sarah Bohndiek discusses how advances in physics and engineering can be used to create imaging techniques that help reveal the earliest signs of cancer. Philip Garsed and Rachel Garsed explore the science and engineering behind machines that are used to explain the inner workings of the Universe, and Dave Ansell returns with his vacuum bazookas and custard fireballs. For details and timings, visit: [outreach.phy.cam.ac.uk/scifest](http://outreach.phy.cam.ac.uk/scifest)

**1PM – 5PM**

→ **SAT 25 MAR**

Cavendish Laboratory,  
JJ Thomson Avenue,  
CB3 0HE

### **PERSONALISING PRODUCTION: THE FUTURE IS CLOSER THAN YOU THINK**

Dr Tim Minshall and colleagues from the Institute for Manufacturing explore the extraordinary world of 'digital manufacturing' and how it is allowing all of us to get exactly what we need, when we need it.

**1.30PM – 2.30PM** Pre-book  
**3.30PM – 4.30PM**

→ **SAT 25 MAR**

Institute for Manufacturing,  
Charles Babbage Road,  
CB3 0FS

### **COMMUNICATION USING LIGHT**

Light has been used for communication for thousands of years. See the ways light can be used to transmit information, from sending data along optical fibres, using lasers to encrypt secret online data, to new technologies like Li-Fi, which uses light as a secure digital means of communication.

**1.45PM – 2.45PM**

→ **SAT 25 MAR**

Department of Materials  
Science and Metallurgy,  
Charles Babbage Road,  
CB3 0FS

### **DOCTOR WHO MADE ME INTO A SCIENTIST**

Dr Marek Kukula and Simon Guerrier, authors of *The Scientific Secrets of Doctor Who*, show how science fiction predicts and sometimes prompts real discoveries, and how it inspires children — like Marek when he was younger — to careers in science. Presented by Anglia Ruskin University.

**2PM – 3PM** Pre-book

→ **SAT 25 MAR**

Anglia Ruskin University,  
East Road, CB1 1PT

### **MATHS VS DISEASE**

Can mathematics really help us in our fight against infectious disease? Dr Julia Gog explores some exciting current research areas where mathematics is being used to study pandemics, viruses and everything in between, with a particular focus on influenza.

**2PM – 3PM** Pre-book

→ **SAT 25 MAR**

Centre for Mathematical  
Sciences, Wilberforce Road,  
CB3 0WA

### **EQUALITY AT WORK IN SCIENCE AND TECHNOLOGY PROFESSIONS**

#### **AFTER BREXIT**

Organised by Dr Sunrita Dhar-Bhattacharjee and Dr Anna Paraskevopoulou, Anglia Ruskin University, this panel addresses current and future trends in the area of equality at work within the socioeconomic climate of Brexit in science and technology professions.

**2PM – 4PM** Pre-book

→ **SAT 25 MAR**

Anglia Ruskin University,  
East Road, CB1 1PT

### **PECHA KUCHA CHALLENGE**

Graduate engineering students take on the challenge of sharing their research with you in just six minutes forty seconds. Will they succeed? Join us for just one or stay for as many as you like — they can be addictive!

**2PM – 4PM**

→ **SAT 25 MAR**

Institute for Manufacturing,  
Charles Babbage Road,  
CB3 0FS

Ideal for teenagers



**Dr Anna Middleton**  
Head of Society and Ethics  
Research, Wellcome Genome  
Campus, Cambridge

I am fascinated by family – the silver thread of DNA that links us to our biological relatives. My PhD is in Genetics and Psychology, where science and social science collide. I'm continually asking 'what does genetics really mean to people?'

**SEE ANNA' EVENT**

Your DNA, your say

**6PM – 7.30PM**

**MON 13 MAR**

**PAGE 09**

It's possible to test for 20,000 genes in a single blood sample; this is available now in the NHS. Why is this relevant to you? Even if you are not using any health services at the moment, you might be biologically related to someone who is. This fast paced new age has given rise to unique ethical and moral questions that my group explores.

Genetic research has the potential to unlock so many answers in medical diagnoses and treatment. However, this can only be successful if DNA and medical data is donated by thousands (or ideally, millions) of people, and then stored in online databases where it can be accessed by scientists and researchers from all over the world. But how do people feel about their genomic data (their entire blueprint, more personal than a fingerprint or an iris scan) being incorporated into Big Data?

I'm leading a new global research project, called Your DNA Your Say, which takes the form of a 'film-survey' experience. First, a series of short films introduces participants to the practical and ethical issues of DNA and medical data sharing; then, a survey follow in which participants are asked for their views on data donation and whether they perceive any harms associated with this.

In my Cambridge Science Festival presentation, I will explain more about genomics, what it can do for you and why genomics and Big Data go hand in hand. I'll show the films we created to explain this. I will share the stage with colleagues from the Public Engagement team at the Wellcome Genome Campus and together we will bring you up to speed with what's happening in genomics.

[www.youtube.com/watch?v=zr1vZZ-QsFs](http://www.youtube.com/watch?v=zr1vZZ-QsFs)

**YOUR DNA,  
YOUR SAY**

### WHY PHYSICS: HOW CAN I HELP MY CHILD? PARENTS' EVENT

Not sure what a physics degree might lead to for your child? Want to help them get to university but not sure how? Join the team from Isaac Physics, an online physics resource aimed at the transition from A-level physics to university level, to find answers to these questions.

**2.30PM – 3.15PM**

→ **SAT 25 MAR**

Cavendish Laboratory,  
JJ Thomson Avenue,  
CB3 0HE

### ATOMS TO PLANETS: UNDERSTANDING PLANETARY MAGNETIC RECORDS USING NANOSCALE MICROSCOPY

Discover the advanced scientific techniques used to study tiny rare rock samples from Earth's earliest era and to examine meteorites that have fallen to Earth. This information may tell us how planets and asteroids form and evolve over time.

**3PM – 4PM**

→ **SAT 25 MAR**

Department of Materials  
Science and Metallurgy,  
Charles Babbage Road,  
CB3 0FS

### THE MEDIA MATTERS FOR MEN AND WOMEN

Dr Magdalena Zawisza, Anglia Ruskin University, talks about how the media can affect both men and women personally, and what can be done about it.

**3.30PM – 4.30PM** Pre-book

→ **SAT 25 MAR**

Anglia Ruskin University,  
East Road, CB1 1PT

### UNFAIRNESS RUFFLES CROWS' FEATHERS

People, primates and dogs all react negatively when others get a better reward for doing the same work. But what about clever birds? Dr Claudia Wascher, Anglia Ruskin University, shows how crows, trained to exchange tokens for food, respond when they are treated unequally.

**3.30PM – 4.30PM** Pre-book

→ **SAT 25 MAR**

Anglia Ruskin University,  
East Road, CB1 1PT

### USING ISAACPHYSICS.ORG IN YOUR A-LEVEL TEACHING: TEACHERS' EVENT

Isaac Physics is a free online tool featuring physics skills practice and problem-solving questions; it is aimed at improving the problem-solving skills of physics A-level students. It can also help you save time marking! Find out how at this professional development session.

**3.30PM – 4.30PM** Pre-book

→ **SAT 25 MAR**

Cavendish Laboratory,  
JJ Thomson Avenue,  
CB3 0HE

### GAMIFY YOURSELF TOWARDS A SMARTER LIFESTYLE

Dr Jan Storgards, Anglia Ruskin University, shows how digital games can be used as a source of motivation to change your lifestyle behaviours in health, learning and environmental sustainability.

**3.30PM – 5PM** Pre-book

→ **SAT 25 MAR**

Anglia Ruskin University,  
East Road, CB1 1PT

### A ROLLER-COASTER GUIDE TO EXPLORING THE MIND WITH TECHNOLOGY

Modern technology offers unprecedented ways in which to understand people, their inner lives and overt behaviours. Dr Sharon Morein, Anglia Ruskin University, explores some of the ethical, legal and social issues arising from modern research into the mind.

**5PM – 6PM** Pre-book

→ **SAT 25 MAR**

Anglia Ruskin University,  
East Road, CB1 1PT

### ATTRACTION EXPLAINED: THE SCIENCE OF HOW WE FORM RELATIONSHIPS

Can science explain how we form relationships? Professor Viren Swami, Anglia Ruskin University, looks at how factors such as geography, appearance, personality and similarity affect who we fall for and why.

**5PM – 6PM** Pre-book

→ **SAT 25 MAR**

Anglia Ruskin University,  
East Road, CB1 1PT

↓ **Sun 26 Mar****SCIENCE ON SUNDAY  
TALK SERIES: WHAT LINKS  
ANTARCTIC SNOW ALGAE,  
SCOTTISH SALMON AND  
THE BOTANIC GARDEN**

Science on Sunday is a programme of informal monthly drop-in talks at the Botanic Garden from March to August. The series launches during the Cambridge Science Festival with Dr Matt Davey from the Department of Plant Sciences.

**11AM – 11.30AM****2PM – 2.30PM**→ **SUN 26 MAR**

Brookside Classroom, Botanic Garden, 1 Brookside, CB2 1JE

Normal Garden admission fee applies

**SCI-TUNES**

Demos, dancing and diagrams collide in Sci-Tunes, as comedy science troubadour and science teacher Jonny Berliner shows you how to rock out musically and geologically with a show of science-inspired songs exploring everything from the physics of falling eggs to cosmological comparisons with kumquats!

**11AM – NOON**

Pre-book

→ **SUN 26 MAR**

UTC Cambridge, Robinson Way, CB2 0SZ

Great for families

“A really thought provoking event, thank you.”

2016 Festival attendee

**METABOLISM AND CANCER**

Several lines of evidence indicate that cancer can be seen as a metabolic disease. Dr Christian Frezza, MRC Cancer Unit, describes approaches to investigate cancer metabolism in order to understand new mechanisms of cancer development and to identify new approaches for cancer detection and therapy.

**12.15PM – 1PM**

Pre-book

→ **SUN 26 MAR**

Cancer Research UK  
Cambridge Institute,  
Robinson Way, CB2 0RE

**BRAIN INJURY AND  
PATIENT- INSPIRED  
INNOVATION**

An interactive session with Headway Cambridgeshire and NIHR Brain Injury HTC, testing a new board game created by people with a brain injury for people with any form of cognitive impairment. Designed to challenge aspects of memory, concentration, communication, behavioural responses, planning & organisation as well as spark debate and encourage group work. Are you up for the challenge?

**12.30PM – 1.30PM**→ **SUN 26 MAR**

UTC Cambridge,  
Robinson Way, CB2 0SZ

There is no need to pre-book events unless specifically stated

To pre-book, visit:

[www.sciencefestival.cam.ac.uk](http://www.sciencefestival.cam.ac.uk)

or call: 01223 766766

### IMAGING CANCER

A prize-winner from the CRUK & EPSRC Cancer Imaging Centre in Cambridge and Manchester's public engagement competition highlights their work and the work of the Cancer Imaging Centre. The Centre brings together internationally renowned scientists and clinicians working on cutting-edge imaging technologies within the field of oncology.

**1PM – 1.45PM** Pre-book  
→ **SUN 26 MAR**

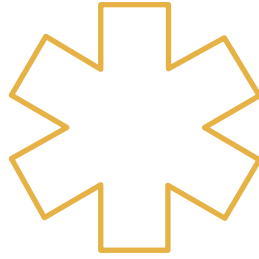
Cancer Research UK  
Cambridge Institute,  
Robinson Way, CB2 0RE

### CANCER: EXACTLY THE WRONG EVENTS, IN EXACTLY THE WRONG ORDER

The hallmarks of cancer arise when healthy cell behaviour runs amok. Rare failures allow cells to misbehave, overcoming preventative built-in controls. Dr Ben Hall, MRC Cancer Unit, talks about how concepts from computer science can be designed to find these flaws and used to understand and treat cancers.

**1.45PM – 2.30PM** Pre-book  
→ **SUN 26 MAR**

Cancer Research UK  
Cambridge Institute,  
Robinson Way, CB2 0RE



### ENGINEERING SOLUTIONS TO MEDICAL PROBLEMS

The worlds of medicine and engineering are much closer than you think. Aerospace 3D printing of metals for jet engine parts can also be used to rebuild the body. Superglue can save lives in brain surgery. Fibres used in Formula 1 racing cars are used to replace snapped tendons. In the tradition of Ewen Kellar's previous talks, expect live experiments and noisy demonstrations.

**2PM – 2.45PM** Pre-book  
→ **SUN 26 MAR**

UTC Cambridge,  
Robinson Way, CB2 0SZ

Great for families

### WHEN ONE SIZE DOESN'T FIT ALL

One size of bra won't fit ten different women. So why should one cancer treatment? Meet Dr Jean Abraham and the Cambridge team that is revolutionising breast cancer research through personalised treatment. This breakthrough allows doctors to immediately give patients the therapies that will work best for them.

Presented with ACT  
Addenbrooke's Charitable Trust

**3.15PM – 4PM** Pre-book  
→ **SUN 26 MAR**

UTC Cambridge,  
Robinson Way, CB2 0SZ

All events  
are free  
unless  
otherwise  
stated





# Meet the Researcher Dr Ewan St. John Smith

Department of Pharmacology, University of Cambridge

The naked mole-rat looks rather peculiar, a mammal that lacks fur with wrinkly skin and large teeth protruding through its lips – they have been (unkindly) described as looking like a cocktail sausage with teeth. This outward appearance belies the true majesty of the naked mole-rat. Majesty may seem an odd word, but it is highly appropriate in this instance as naked mole-rats live in large, subterranean colonies that are headed by a single breeding female, the queen.

In addition to this unusual societal way of living, naked mole-rats are cold-blooded, exceptionally long-lived (~30 years), highly resistant to cancer, do not appear to develop neurodegenerative conditions with ageing and are also resistant to the pain induced by acid – ambivalence to acid as painful is highly unusual with worms, leeches, fish, mice and humans all possessing sensory nerve fibres that are activated by acid. By comparing the highly unusual biology of the naked mole-rat with more “normal” organisms, we have identified mechanisms that drive certain biology and behaviours. Further study will not only help us understand what makes the naked mole-rat so unusual, but may also unlock secrets about the causes of cancer and a plethora of other conditions.

For the online version:

[www.cambridge-tv.co.uk/ageing](http://www.cambridge-tv.co.uk/ageing)

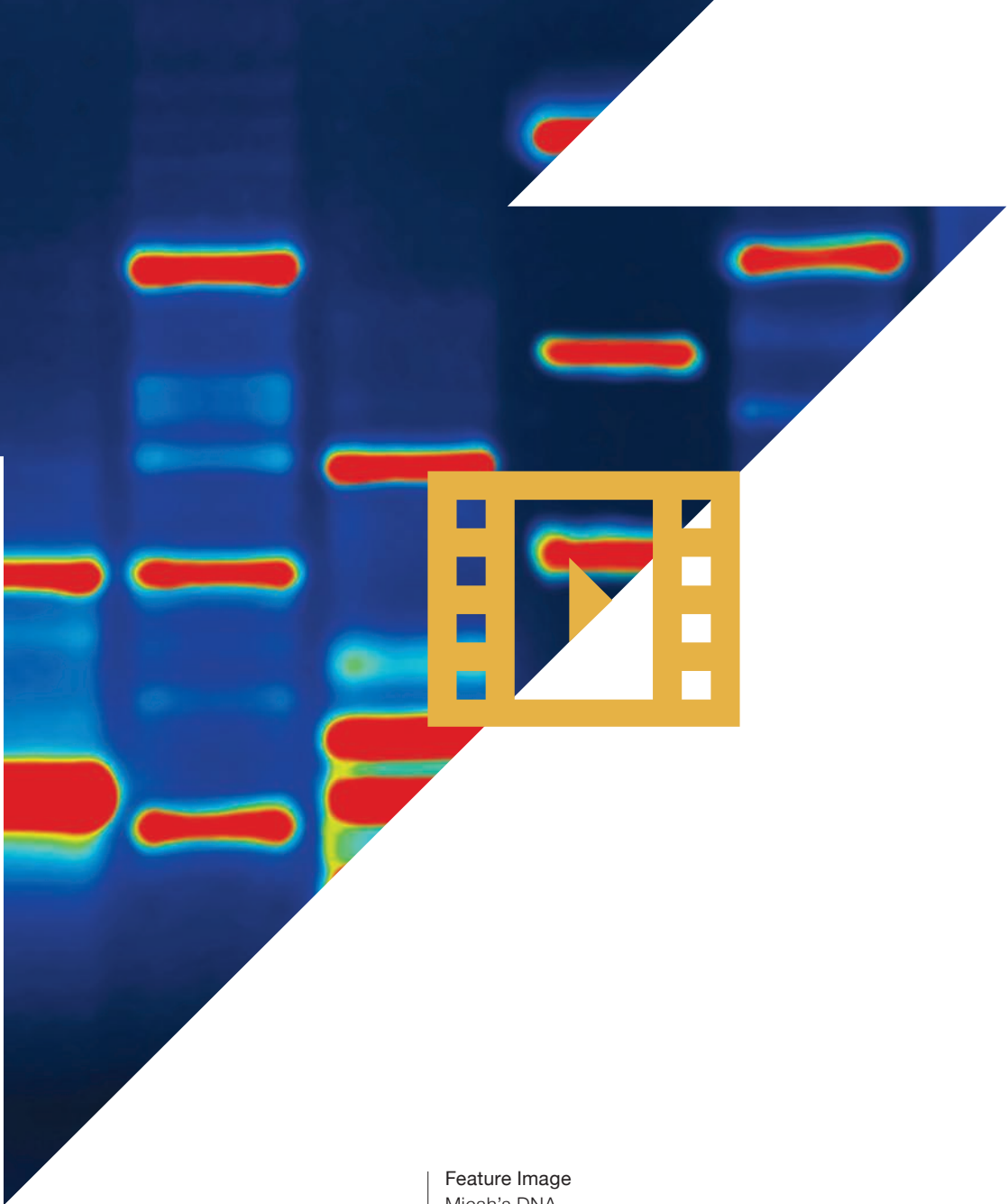
## SEE EWAN'S EVENT:

Life lessons from the naked mole-rat: pain and much, much more

**6PM – 7PM**  
**MON 20 MAR**  
**PAGE 21**



# Films





## DNA, relationships and our senses explored through classic and contemporary film



### THE GOD PARTICLE: A SCIENTIST AND A VICAR WALK INTO A BAR

A quantum physicist and a vicar join forces to solve a perplexing mystery and discover the real meaning of faith, knowledge, love and the importance of keeping an open mind. This screening of the play by James Caryl is hosted by the Faraday Institute for Science and Religion.

**6.30PM – 8.30PM** Pre-book  
→ **MON 13 MAR**

St John's College Old Divinity School, All Saints' Passage, CB2 1TP

“Really entertaining but with good science content and pitched well across all age groups”

2016 Festival attendee

### SCISCREEN CAMBRIDGE

Join the British Science Association Cambridge Branch for a special screening of *Notes on Blindness*, with guest speaker Dr Louise Fryer, UCL, who discusses the psychology of immersion in audio-visual media, as it relates to viewers with sensory impairment.

**6.15PM – 8.30PM** Pre-book  
→ **TUE 21 MAR**

Arts Picturehouse, St Andrew's Street, CB2 3AR

Normal ticket price applies

### LIFE STORY: A FILM DRAMATISING THE DISCOVERY OF THE STRUCTURE OF DNA

*Life Story*, also known as *The Race for the Double Helix*, is being shown as part of a Rosalind Franklin commemoration at Newnham College. A must for anyone with an interest in the biggest discovery in biology since Darwin's theory of evolution.

**5PM – 7PM**  
→ **SAT 25 MAR**

Lucia Windsor Room, Newnham College, Sidgwick Avenue, CB3 9DF

To pre-book, visit:  
[www.sciencefestival.cam.ac.uk](http://www.sciencefestival.cam.ac.uk)  
or call: 01223 766766

There is no need to pre-book events unless specifically stated

# Performances



Feature Image  
Sulphur by Shelia Ghelani  
credit: John Hunter at RULER



Laughs and serious science through comedy, song, dance, poetry and performance

## ↓ Pre-Festival

### CAMBRIDGE GRADUATE ORCHESTRA PRESENTS BRITISH SEA SCAPES

Overture by Cambridge composer David Roche, conducted by Benedict Collins Rice with soloist Jessica Dandy.

**7.15PM – 10PM** Pre-book  
→ **SAT 11 MAR**

West Road Concert Hall,  
West Road, CB3 9DP

£12 / £8 concessions /  
£6 students and children

### SOUNDS OF SCIENCE

Inspired by ten key moments in the history of science and the sounds used to represent them, this performance includes a mesmerising 21-minute soundscape performed by renowned sound artist Evelyn Glennie.

**4.30PM – 6.30PM** Pre-book  
→ **SUN 12 MAR**

Cambridge Corn Exchange,  
Wheeler Street, CB2 3QB

£22 / £15 children (two children's tickets for the price of one)

## ↓ Mon 13 Mar

### JON ADAMS: GAMES WITH THE WATER HORSE

Jon Adams is a multi-disciplinary conceptual artist whose work references his synaesthesia and Asperger's. He weaves into his performance fragments of autobiography, science and hidden metaphor.

**4PM – 5.30PM** Pre-book  
→ **MON 13 MAR**

Cambridge Union Society,  
Bridge Street, CB2 1UB

Tickets £10 on the door, proceeds to the Autism Research Trust

### CHROMOS: ZOOM INTO THE 3D STRUCTURE OF OUR CHROMOSOMES

Babraham Institute geneticists study how DNA packaging affects gene expression, which in turn influences our health, longevity and much more. To further explore their data, they have been collaborating with visual artist Andy Lomas and musician Max Cooper to turn their research into multidimensional art. Join us for an opportunity to climb inside the data and find out what it really means.

**7PM – 9PM** Pre-book  
→ **MON 13 MAR**

Hidden Rooms,  
7b Jesus Lane, CB5 8BA

Adults only  
£5 including drink

### CAMBRIDGE SCIENCE FESTIVAL CEILIDH

Our Festival ceilidh with science-themed dances including Newton's Cradle, and featuring the Red Rock Ceilidh Band with callers Ed Emery and Robin Fairey.

**8PM – 10PM** Pre-book  
→ **MON 13 MAR**

Emmanuel United Reformed Church, Trumpington Street, CB2 1RR

£8 / £5 students and concessions / under 12s free

## ↓ Tue 14 Mar

### THE VARIABLES PRESENT... AN EVENING OF SCIENCE VARIETY

Join experienced science comedians and Cambridge's top new talent for an evening of science, comedy, poetry and more!

**7.30PM – 9.30PM** Pre-book  
→ **TUE 14 MAR**

The Boathouse,  
14 Chesterton Road,  
CB4 3AX

£3.30

### DANAUS

Danaus, mythical king, meets Danaus, butterfly genus, in this musical exploration of murdered males and the intersections of science, poetry and performance. Tim Watts's new piece of music theatre is fuelled by the collision of Simon Martin's genetic research with Clare Pollard's poetry.

**8PM – 9.15PM** Pre-book  
→ **TUE 14 MAR**

St John's College Old Divinity  
School, All Saints' Passage,  
CB2 1TP

## ↓ Thu 16 Mar

### LEVEL UP HUMAN

How would you improve humans? Join host Simon Watt, comedian Samantha Baines, and Wellcome Genome Campus researchers for Level Up Human, an optimistic podcast with ambition for the human race.

**6.30PM – 8.30PM** Pre-book  
→ **THU 16 MAR**

Conference Centre,  
Wellcome Genome Campus,  
Hinxton, CB10 1SA

## “Terrific! Accessible for our children and we learnt something new too!”

2016 Festival attendee

### BRIGHT CLUB

*Bright Club* is otherwise known as 'The Thinking Person's Variety Night' and we've brought together the City's funniest scientists to try their hand at stand-up. Warning, this will not be your standard educational event. Join us for beer and laughs!

**7.30PM – 10PM** Pre-book  
→ **THU 16 MAR**

The Portland Arms,  
Chesterton Road, CB4 3BA

£5

## ↓ Tue 21 Mar

### ENGINEERING SHOWOFF

A night of chaotic comedy cabaret featuring eight of Cambridge's most exciting engineers telling jokes about their work for the first time, hosted by Steve Cross, comedian and creator of *Science Showoff*.

**7.30PM – 10PM** Pre-book  
→ **TUE 21 MAR**

The Portland Arms,  
Chesterton Road, CB4 3BA

£5 / £8 on the door

## ↓ Thu 23 Mar

### Cambridge Junction presents a double bill

#### BREATH CONTROL BY CAROLINE WRIGHT

*Breath Control* is about the inhalations and exhalations that form the melody, rhythm and punctuation of our everyday existence. Blending dance, installation and the first ever Breath Choir, it brings together scientific, medical, musical and philosophical perspectives in a performance that will cause you to – literally – catch your breath.

**7PM – 8PM** Pre-book  
**THU 23 MAR**

Followed by a discussion  
with artists and scientists

#### SULPHUR BY SHEILA GHELANI

A chemical element. A part of you. A hellish tale. A kind of love story. *Sulphur* is a poetic and choreographic ensemble performance which considers the history and mythology of the element, its role within industry, climate change and its existence within our bodies.

**8.30PM – 9.30PM** Pre-book  
→ **THU 23 MAR**

Cambridge Junction,  
Clifton Way, CB1 7GX

£10 / £6 concessions  
for one performance or  
£12.50 / £8 concessions  
for both performances

**PAUL DUNCAN MCGARRITY:  
ASK AN ARCHAEOLOGIST**

An experiment. An archaeologist answers your questions on any subject as honestly as possible. Jokes are thrown out at pace alongside a really interesting conversation about archaeology.

**7.45PM – 8:45PM** Pre-book  
→ **THU 23 MAR**

The Basement, CB2 Café,  
Norfolk Street, CB1 2LD

£5

**WILL SEAWARD HAS  
A REALLY GOOD GO  
AT ALCHEMY**

Will Seaward is going to attempt to create the philosopher's stone, live. Genuinely. He'll also be trying to make the elixir of life.

**9PM – 10PM** Pre-book  
→ **THU 23 MAR**

The Basement, CB2 Café,  
Norfolk Street, CB1 2LD

£5

↓ **Fri 24 Mar****EVERYONE IS  
RIGHT! PERFORMING  
CORNELIUS CARDEW'S  
GRAPHIC SCORE**

A performance in which a group of artists and scholars collectively investigate the relationship between sounds and sign, between lines and music. What happens when a musical score doesn't make sense? We endeavour to perform the graphic figures of Cornelius Cardew's *Treatise* (1967). Through collective interaction and exploring practice, we create a musical score.

**7PM – 8PM** Pre-book  
→ **FRI 24 MAR**

The Old Labs, Newnham  
College, Sidgwick Avenue,  
CB3 9DF

**AN EVENING OF  
UNNECESSARY DETAIL**

In short, an event where 80% of the words in the title start with a vowel, and of the 16 unique letters in the title, 31.25% of them are used more than once. It's also an event hosted by Steve Mould and Helen Arney (Festival of the Spoken Nerd), enthusiasts, scientists, miscellaneous experts and comedians who will talk about whatever they want.

Presented with TTP Group

**7PM – 9.30PM** Pre-book  
→ **FRI 24 MAR**

Cambridge Union Society,  
Bridge Street, CB2 1UB

£10

For confirmed guests, visit:  
[festivalofthespokennerd.com](http://festivalofthespokennerd.com)

↓ **Sun 26 Mar****CAMBRIDGE JUNCTION  
PRESENTS ENSONGLOPEDIA  
OF SCIENCE**

A song about science for every letter of the alphabet. Expect atoms, big bangs, cells, X-rays, Y-chromosomes and zoology. Expect the unexpected. And expect it to rhyme. John Hinton is a multi-award-winning writer and performer of musical comedies about Darwin, Einstein and Curie.

**2.30PM – 3.30PM** Pre-book  
**7PM – 8PM**  
→ **SUN 26 MAR**

Cambridge Junction,  
Clifton Way, CB1 7GX

£12 / £8 concessions  
Great for families

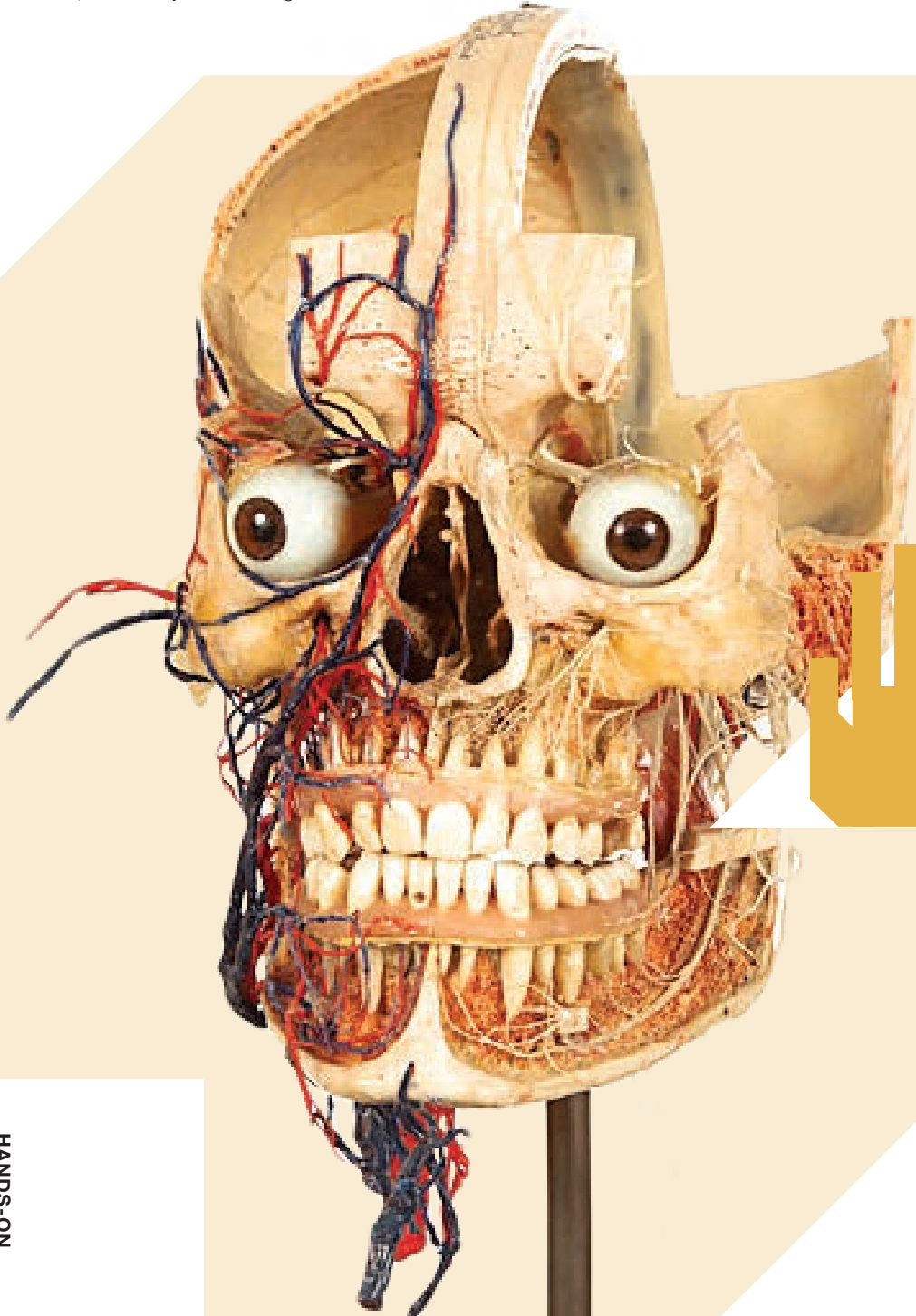
**There is  
no need to  
pre-book  
events unless  
specifically  
stated**

To pre-book, visit:  
[www.sciencefestival.cam.ac.uk](http://www.sciencefestival.cam.ac.uk)  
or call: 01223 766766

# Hands-on

## Feature Image

Anatomy at the cutting edge  
credit: Department of Anatomy,  
University of Cambridge







From brains and diet to earthquakes and engines, explore science through activities, tours and workshops

## ↓ Pre-Festival

### GET PERSONAL WITH YOUR 100 TRILLION MICROBIOME FRIENDS

The significance of the human microbiome is increasingly being recognised in health and disease. Join British Science Association Cambridge Branch to create your personal microbiome print.

**NOON – 4PM**

→ **SAT 11 MAR**

Grafton Centre, CB1 1PS

## ↓ Mon 13 Mar

### SEE YOUR BABY'S BRAIN LEARN

Do you feel 'in tune' with your baby? How does play help your baby learn? Why is face-to-face interaction so important? We invite mothers and babies aged 8–15 months to visit the Baby-LINC Lab and take part in an EEG study on social learning in infants.

**9AM – 5PM** Pre-book

→ **MON 13 MAR**

+ **WED 15 MAR**

+ **FRI 17 MAR**

Department of Psychology,  
Downing Site, CB2 3EB

### EMBODIED SCIENCE: WHERE DO YOU FEEL HUNGER IN YOUR BODY?

Join Elaine Westwick for a body-based enquiry into the sensations of hunger. Is everyone the same or are we all different? Explore your experiences and find out about the experiences of others.

**NOON – 1PM** Pre-book

→ **MON 13 MAR**

Friends' Meeting House,  
12 Jesus Lane, CB5 8BA

## ↓ Tue 14 Mar

### DARWIN'S EVOLUTIONARY TALES

What was Darwin's big idea? How did he carry out research? Why is he important? A workshop looking at the hows and whys of Darwin's life and his work on evolution.

**10.30AM – NOON** Pre-book

→ **TUE 14 MAR**

Milstein Room, Cambridge  
University Library, West Road,  
CB3 9DR

Great for families

### SCENTS AND SOUNDS OF SCIENCE

Join us for science experiments that explore different scents and sounds in chemistry and physics that help with communication or just keep us clean!

**5PM – 8PM** Pre-book

→ **TUE 14 MAR**

Cambridge Regional College,  
King's Hedges Road, CB4 2QT

Great for families

## ↓ Wed 15 Mar

### THE POLAR MUSEUM LITTLE EXPLORERS: WANDERING ROCKS

Dive below the polar surface in search of rocks, fossils and other natural objects in this sensory story session for the under 5s with storyteller Marion Leeper.

**10AM – 11AM** Pre-book

**11.15AM – 12.15PM**

→ **WED 15 MAR**

The Polar Museum,  
Lensfield Road, CB2 1ER

To pre-book, visit:  
[www.sciencefestival.cam.ac.uk](http://www.sciencefestival.cam.ac.uk)  
or call: 01223 766766

There is no need to pre-book events unless specifically stated

**HOW DID THEY DO THAT?**

Explore the science behind some of our best-loved museum objects through child-focused activities. Join educators at the Fitzwilliam Museum and members of the Whipple Museum of the History of Science to explore how artists have drawn on science when making their works.

**10.30AM – 11.30AM** Pre-book

**1.30PM – 2.30PM**

→ **WED 15 MAR**

Meet at the Courtyard  
Entrance, Fitzwilliam Museum,  
Trumpington Street, CB2 1RB

For 3–5-year-olds and their adults

**EXPLORING YOUR MIND AND BRAIN**

An evening at the MRC Cognition and Brain Sciences Unit exploring their research in psychology and neuroscience through practical activities, experiments and short talks.

**6PM – 8.30PM** Pre-book

→ **WED 15 MAR**

MRC Cognition and Brain  
Sciences Unit, 15 Chaucer  
Road, CB2 7EF

↓ **Thu 16 Mar**

**BUG YOUR BEDROOM**

Using a Raspberry Pi and some clever Python code, learn how to create the beginnings of an intruder alarm to protect your bedroom from being invaded by your parents and siblings!

**4.30PM – 6.30PM** Pre-book

→ **THU 16 MAR**

Centre for Computing History,  
Rene Court, Coldhams Road,  
CB1 3EW

£12 / £8 accompanying adult  
(required for under 14s)  
Ideal for teenagers

**MAKE YOUR OWN 17TH-CENTURY DIARY**

This workshop examines the practice and meaning of writing diaries in the past and today, and considers how we decide what is important to record for posterity and whether this has changed over time.

**5PM – 6.30PM** Pre-book

→ **THU 16 MAR**

Whipple Museum of the History  
of Science, Free School Lane,  
CB2 3RH

**FOUR YEARS OF MAKESPACE: A SHOWCASE**

Join the fourth birthday party of Makespace, a community workshop based in the heart of Cambridge. See some of the projects made here over the years and watch various bits of kit, including 3D printers and laser cutters, in action.

**6.30PM – 9PM**

→ **THU 16 MAR**

Makespace,  
16 Mill Lane, CB2 1RX

↓ **Fri 17 Mar**

**BUILD A NEURAL KNITWORK**

Crochet, knot, knit, wrap or solder a neuron! Join makers and neuroscientists and discover how to sustain a healthy brain.

**4PM – 5PM** Pre-book

**5PM – 6PM**

**6PM – 7PM**

**7PM – 8PM**

**8PM – 9PM**

→ **FRI 17 MAR**

Makespace,  
16 Mill Lane, CB2 1RX

**All events  
are free  
unless  
otherwise  
stated**



## ↓ Sat 18 Mar

### INTRODUCING ADAPTIVE TESTING

Computer adaptive testing is gaining popularity in psychological assessment and can assess cognitive ability using a smaller set of questions than standardised tests. Give it a try for yourself.

**9AM – 5PM**

→ **SAT 18 MAR**

Psychology Classroom,  
Department of Psychology,  
Downing Site, CB2 3EB

### MINDREADING

How well do you think you can tell what someone else thinks, knows or sees? Try some quick experiments and test yourself. It might be harder than you think!

**9AM – 5PM**

→ **SAT 18 MAR**

Psychology Classroom,  
Department of Psychology,  
Downing Site, CB2 3EB

### BABIES: RHYTHM AND LANGUAGE

Have you ever wondered how we learn language? Evidence shows that brainwave rhythms alter to align with rhythms in speech. At the CNE BabyLab, we measure this 'rhythmic processing' in babies' brains. Discover the importance of rhythms in language or even sign up your baby to take part in this project.

**9AM – 6PM**

→ **SAT 18 MAR**

Psychology Classroom,  
Department of Psychology,  
Downing Site, CB2 3EB



### CNE BABYLAB TOURS: RHYTHM AND LANGUAGE

Using brainwave scanning caps and motion capture cameras (like in the movies!), the CNE BabyLab measures how brainwaves and movements develop in infants and how this affects language. Visit our labs to discover how.

**9AM – 6PM**

→ **SAT 18 MAR**

Psychology Classroom,  
Department of Psychology,  
Downing Site, CB2 3EB

### ARC SOC'S PAVILION

The student Architecture Society's Pavilion Team has created an interactive installation to explore and provoke discussion. Using a self-built architectural device, they are investigating conversations in personal spaces; join them and get involved in their approach to getting personal.

**9AM – 6PM**

→ **SAT 18 MAR**

+ **SUN 19 MAR**

Department of Chemistry Car  
Park, Lensfield Road, CB2 1EW

### CLUESCAPE: CURIOUS OBJECTS

Cambridge University Library's new exhibition highlights some most unusual and unexpected items. From ectoplasm to an old boot, the Library holds much more than just books. In this team escape game, solve the puzzles, crack the codes and find the elusive 'curious object' that didn't make it into the exhibition.

**9.10AM – 10AM**

Pre-book

**10.25AM – 11.15AM**

**11.40AM – 12.30PM**

**12.55PM – 1.45PM**

**2.10PM – 3PM**

**3.25PM – 4.15PM**

→ **SAT 18 MAR**

Milstein Room,  
Cambridge University Library,  
West Road, CB3 9DR

£10 per team

### ONE DAY IN THE LIFE OF A PROFESSIONAL HACKER

See what a hacker does for a living and find out why big companies hire hackers to secure their systems. Learn the secrets of one of the most thrilling and in-demand professions of the moment.

**10AM – 2PM**

→ **SAT 18 MAR**

Friends' Meeting House,  
12 Jesus Lane, CB5 8BA

# Hands-on at the Guildhall

## Stem cells and ageing, exercise and diet, DNA and new treatments for disease – join our scientists and discover how your body works.

**10AM – 4PM**

→ **SAT 18 MAR**

**NOON – 4PM**

→ **SUN 19 MAR**

The Guildhall,  
Market Square, CB2 3QJ

Saturday evening event P.50

### A healthier you in a high-tech future?

Technology makes it easier than ever to learn about ourselves, from our genes to our daily lives. Join MRC Epidemiology Unit scientists to discover what this means for our health.

### A medicine for your heart

Is your pulse racing? Join scientists from the Department of Pharmacology to find out how medicines can make your heart beat faster or slower.

### Are your hands really clean?

Using our UV gel, test how well you wash your hands. See how germs that are capable of causing infection can be spread via items we regularly touch. Presented by Anglia Ruskin University.

### Babraham Institute molecular explorers

Scientists at the Babraham Institute are trying to answer some tough questions about how our bodies work and how they change as we age. They need your help! Step into our pop-up lab and take part in experiments. Will your research help us to understand even more?

### Cells up close

Our bodies contain trillions of cells, all adapted for specialised roles in different tissues. Join researchers from the Cambridge Institute for Medical Research for activities that highlight the inner workings of cells and changes that result in disease.

### Fat: behind the scenes

How long do you think it would take you to burn off the fat found in a burger meal? Discover more about the fat found in food as well as the fat found in your body!

→ **SAT DAYTIME ONLY**

### Getting personal with statistics

Join the MRC Biostatistics Unit and take part in activities that provide an exciting insight into why statistics is important and how it helps us to understand what is going on in the world.

→ **SAT ONLY**

### Hay fever: not to be sneezed at!

Do you suffer from hay fever? Do your eyes itch with high pollen counts? Discover more about low-allergen plants through activities and discussions with researchers from the Royal College of Pathologists and Public Health England.

### Hills Road hands-on biology

Hills Road Sixth Form College welcomes visitors to take part in hands-on biology activities guaranteed to engage, educate and entertain.

### How long is a piece of string?

Or, more accurately, how long do you think the DNA in your body's cells would be if stretched out end to end? Find out and discover lots of rare disease facts with the NIHR Rare Diseases Translational Research Collaboration scientists.

→ **SAT DAYTIME ONLY**

### Human dynamo

Your body is a machine that converts the fuel you eat and drink into the energy you need to move, think or grow. Join metabolic scientists for activities and games, and take a closer look at how our bodies do 'their thing'.

### IMAGINE ID

IMAGINE ID is a research study that seeks to increase our understanding of children and young people with intellectual disability. We aim to find out how genetic changes affect behaviour and hope our results will help care for families and children now and in the future.

→ **SUN ONLY**



### In.D.N.A. Jones and the big genetic data hunt

Explore what we can find out about ourselves from our DNA through activities with staff from the Wellcome Genome Campus.

### Institute of Engineering and Technology

Do you want to become an engineer? Find out about a career in engineering from members of the Institute of Engineering, operate a train and build a torch to take home.

### Meet our sport scientists and test your fitness

Join sports scientists from Anglia Ruskin University and take a trial used by high-performance sailors. Get on our bike and get an estimate of your maximal oxygen uptake (for teenagers and adults only) and, using spirometry, measure your resting lung functions.

### Precision medicine

Join MedImmune and AstraZeneca scientists and have a go at experiments that demonstrate why different people need different medicines. Can you help us find the right medicine for the patient?

### RehabGame: rehabilitation therapy through game

Have a go at our RehabGame, which uses an interface between a Kinect Xbox One and a Myo armband device. Through movement, the system provides real-time feedback to help people recover from neurological injury. Presented by Anglia Ruskin University.

### Science and cereal packets and sweets

Where do our eyes glance when choosing drinks and food products? Join Anglia Ruskin University scientists and have a go at wearing a pair of eye-tracking glasses to make a selection from cereal packets, soft drinks and sweets.

### Science and beer

Join Anglia Ruskin University scientists and have a go at wearing a pair of eye-tracking glasses to make a beer selection from a mock-up of a supermarket shelf.

→ **SAT EVE ONLY**

### Science, you and research

The NIHR Cambridge BioResource is a panel of around ~16,000 volunteers who participate in research studies investigating the links between genes, the environment, health and disease. See what research we do and find out how you can help.

→ **SAT DAYTIME ONLY**

### See your cells!

Use microscopes to see your own cells with the help of the MRC Laboratory of Molecular Biology's Microscope4Schools team, and test your detective skills with our stereomicroscope challenge.

→ **SAT EVE + SUN ONLY**

### Stem cell robots

Stem cells are small, rare and amazing — they can make all of the cells in the human body! But how do they decide which type of cell to become? Meet scientists from the Stem Cell Institute and our stem cell robots, and see if you can program yours to make the right choice.

### The wonderful world of blood vessels

Join scientists from Cardiovascular Medicine to find out how fascinating our blood vessels are, discover what goes wrong in disease and learn what we can do to fix it.

### Walk through dementia

The human brain is the most complex structure known to man. Using the latest technology and hands-on challenges, explore this incredible organ with Alzheimer's Research UK and see how it is affected by dementia.

### What a beautiful brain

How are illusions perceived by the brain? What's behind number processing? How do we choose what to eat? Discover the answers to these and other fascinating questions about how the brain works with scientists from Anglia Ruskin University.

### Your personal immune army

Explore your immune system with Cambridge Immunology and see how your body protects you from attacks by disease-causing agents such as viruses, bacteria and fungi.

→ **SAT EVE + SUN ONLY**



## Meet the Researcher Dr Hatice Gunes

Senior Lecturer, Computer Science Department,  
University of Cambridge

Designing robots with socio-emotional skills is a challenging task. Robots need to be able to provide not only physical, but also social support to their human users, and to engage in interactions with them in various applications, including healthcare, education, entertainment, and guidance in museums and shopping malls. The availability of commercial robots and developments in academia provide us a positive outlook, however, the capabilities of current social robots are still limited.

The main challenge is understanding humans' intentions and behaviours, and how to model these for designing naturalistic, human-inspired behaviours via robots. To address this challenge successfully requires understanding the components of social interaction, including nonverbal behaviours such as gaze, silence, fast speech, interpersonal distance, posture, hand and head gestures, and facial and bodily expressions. To create socio-emotionally intelligent robots, these nonverbal cues need to be interpreted in terms of higher level phenomena such as first impressions, personality and emotions, and in turn defining optimal behaviours to express these phenomena through robotic platforms in an appropriate and timely manner. Achieving this requires the fields of psychology, computer vision, signal processing, machine learning, affective computing and human-robot interaction to constantly interact with one another.

In my talk at this year's Science Festival I will present emerging topics in the field of social robotics with a particular focus on emotions and personality.



### HATICE TALKS AS PART OF:

New horizons in robotics

**10AM – 4PM**

**FRI 24 MAR**

**PAGE 26**



# Plant and life sciences marquee

**Can plants sense us?  
Do flies see what we see?  
What is bioengineering?  
Researchers from across the biological disciplines unite to showcase the personal side of their research. Exhibits include:**

Plants go speed-dating, with the Department of Plant Sciences and CambPlants

Tailor-made crops for tomorrow, with NIAB

How plants get personal, with the Sainsbury Laboratory

Eat food. Not too much. Mostly plants, with the Global Food Security Initiative and Food Security Forum

Eyes, body and brain; learning from flies, fish and shrimp, with the Department of Physiology, Development and Neuroscience

Highlighting biology with fluorescence microscopy, with the Departments of Genetics and Pharmacology and the Linnean Society

Sensors for assisted living, personalised nanotechnology and wearable technology, with the Department of Chemical Engineering and Biotechnology

The 3Rs of animal research, with the AWERB Committee for Replacement, Reduction and Refinement in Animal Experimentation

Discovering humanity through human evolutionary studies, with the Leverhulme Centre for Evolutionary Studies

Engineering biology together, with Synthetic Biology and Biomakespace

**10AM – 4PM**

→ **SAT 18 MAR**

On the lawn,  
Downing Site, CB2 3EA

## FAMILY TREES

Discover the secrets of the trees with our new Family Tree trail at the Botanic Garden. Search for trees in the Garden and discover their secret family mottos. Pick up the free trail at either gate.

**10AM – 4PM**

→ **SAT 18 MAR**

Botanic Garden,  
1 Brookside, CB2 1JE

Normal garden admission fees apply  
Great for families

## LIGHT UP THE CASTLE

Join University of Cambridge engineers, assemble a cardboard cut-out castle and fit a lighting circuit to enhance the interior. Choose a simple but effective two-lamp arrangement or take on a more challenging design.

**10AM – 4PM**

→ **SAT 18 MAR**

University Centre,  
Granta Place, Mill Lane,  
CB2 1RU

Great for families

## SAVING THE WORLD, ONE ATOM AT A TIME

Nuclear power is a vital part of our energy mix, but is not without its challenges. Maintaining safety, reducing energy costs and securing our energy future are a few of the challenges we explore.

**10AM – 4PM**

→ **SAT 18 MAR**

University Centre,  
Granta Place, Mill Lane,  
CB2 1RU

### ARE YOU SMARTER THAN A BIRD?

Visit the Department of Psychology, try out some cognitive tests and see how you rate against yourself, your friends and the world's smartest birds.

**10AM – 4PM**  
→ **SAT 18 MAR**

Department of Psychology,  
Downing Site, CB2 3EB

### HOW DO WE EXPERIENCE TIME

Time is a psychological dimension. We can perceive, estimate and reproduce time chunks. Is there an absolute clock in the brain? Explore the concept of time with researchers from the Department of Psychology.

**10AM – 4PM**  
→ **SAT 18 MAR**

Department of Psychology,  
Downing Site, CB2 3EB

### LIKE APPLES TO ORANGES: NOT QUITE!

An opportunity for children to take part in an interactive video experiment involving fruit and toys, and a chance for adults to talk to the GDRC team about popular conceptions of gender and sex differences in the brain and their research into gender development.

**10AM – 4PM**  
→ **SAT 18 MAR**

Department of Psychology,  
Downing Site, CB2 3EB

### SMELLS IN THE BRAIN, AND IT IS BLISS...

How do you think you smell? What does it matter? Do you smell when you are asleep? Take part in smell experiments, find out more about the cognition of olfaction and bust some neuromyths with Dr Anat Arzi.

**10AM – 4PM**  
→ **SAT 18 MAR**

Department of Psychology,  
Downing Site, CB2 3EB

### THE BATTLES WITHIN OUR BODIES

Discover more about the things that can invade our bodies and our defences against them. Join scientists from the Department of Pathology and explore the fascinating world of germs, cancer, pregnancy and our immune system.

**10AM – 4PM**  
→ **SAT 18 MAR**

Department of Pathology,  
Tennis Court Road, CB2 1QP

### THE EXPLOSIVE EARTH

The Earth is an exciting, explosive place! Join us at the Department of Earth Sciences to explore earthquakes in volcanoes. See volcanic rocks younger than you, try your hand at locating an earthquake and simulate volcanic eruptions.

**10AM – 4PM**  
→ **SAT 18 MAR**

Watson Gallery,  
Department of Earth  
Sciences, Downing Site,  
CB2 3EQ

### CELLS TO SKYSCRAPERS: THE SCIENCE AND ENGINEERING OF 21ST-CENTURY TIMBER

Visit the Centre for Natural Material Innovation's hand-built wooden exhibit, and discover how we combine science and architecture to design 300m tall skyscrapers from timber. Find out why 'wood is good', what makes wood strong and how to stop wood from burning.

**10AM – 4.30PM**  
→ **SAT 18 MAR**

Cyber Café, Department  
of Chemistry, Lensfield Road,  
CB2 1EW

### CHEMISTRY IN ACTION: A MATERIAL WORLD

Explore, feel and enjoy coloured, gooey and shining materials you can touch and change. Explore light and matter in our dark room, and take home colourful art and toys you have created.

Supported by the Walters  
Kundert Charitable Trust

**10AM – 4.30PM**  
→ **SAT 18 MAR**

Department of Chemistry,  
Lensfield Road, CB2 1EW

### CRASH, BANG, SQUELCH! CHAOS AT THE SCIENCE FESTIVAL

Get to grips with exciting, fascinating and just plain weird science that shows you how the world around us works. Students from CHaOS show you what goes on in our experiments — expect lots of science that goes 'crash', 'bang' and 'squelch'!

**10AM – 5PM** Pre-book  
→ **SAT 18 MAR**

Department of Zoology,  
New Museums Site,  
Downing Street, CB2 3EJ





### GAME OF DRAGONS: OUTDOOR MATHS COMPETITION

This spring, every dragon sets off with their friends on an adventure in the land of numbers and puzzles. This maths treasure hunt is open to young people aged 11–18 years old in teams of three.

**10AM – 5.30PM** Pre-book  
→ **SAT 18 MAR**

Girton College, Huntingdon  
Road, CB3 0JG

Ideal for teenagers

### CHAOS ROBOTICS WORKSHOPS AT CRASH, BANG, SQUELCH

Join CHaOS for robotics workshops packed full of hands-on design and programming. We'll teach you all the basics and you can start making your own robots do amazing things in no time at all.

**10.15AM – 11AM** Pre-book  
**11.15AM – NOON**  
**1PM – 1.45PM**  
**2PM – 2.45PM**  
**3PM – 3.45PM**  
→ **SAT 18 MAR**

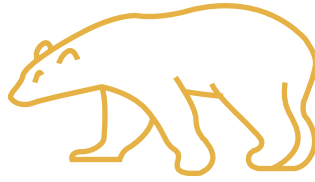
Department of Zoology,  
New Museums Site,  
Downing Street, CB2 3EJ

### FRIENDS, ENEMIES, SCIENTISTS

Walk through Cambridge streets with Society of Cambridge Tourist Guides and become acquainted with some interesting characters from the City's scientific past: people who changed the lives of others with their discoveries, friendships, conflicts and unique personalities.

**10.30AM – NOON** Pre-book  
**2.30PM – 4PM**  
→ **SAT 18 MAR**

Meet outside the Whipple  
Museum of the History of Science,  
Free School Lane, CB2 3RH



### POLAR SCIENCE: BACK TO NATURE

Explore the wonders of nature at the poles! Penguins, plants and colour changing skies all feature during our polar science activity day.

**10.30AM – 3.30PM**  
→ **SAT 18 MAR**

The Polar Museum,  
Lensfield Road, CB2 1ER

Great for families

### THE SCIENCE OF ARCHAEOLOGY

How do we learn about the lives of ancient people? Science! See how archaeologists use science to study past diets, languages, clothes and tools from around the world.

**10.30AM – 4PM**  
→ **SAT 18 MAR**

McDonald Institute for  
Archaeological Research,  
Downing Site, CB2 3ER

### BUILD YOUR OWN ROBOT

Build and program a simple robot, watch it being cut out on a laser cutter and control it from your smartphone.

**11AM – NOON** Pre-book  
**NOON – 1PM**  
**2PM – 3PM**  
**3PM – 4PM**  
**4PM – 5PM**  
→ **SAT 18 MAR**

Makespace,  
16 Mill Lane, CB2 1RX

### JUST BUGS!

Bugs are all around us but how do scientists use them to understand the nitty-gritties of the human body? Enter the basement of the Department of Zoology and discover what we learn by looking at insects in the laboratory.

**11AM – NOON** Pre-book  
**NOON – 1PM**  
**1PM – 2PM**  
**2PM – 3PM**  
**3PM – 4PM**  
→ **SAT 18 MAR**

Department of Zoology,  
New Museums Site,  
Downing Street, CB2 3EJ

### PERSONALISED HEALTH

Visit the Department of Biochemistry and discover how we use information about our genome to understand how genes are turned on and off in disease. See how biochemical techniques are used to direct drug and nutritional treatments to the individuals who will benefit from them the most.

**11AM – 3PM**  
→ **SAT 18 MAR**

Department of Biochemistry,  
Hopkins Building, Downing Site,  
CB2 1QW

### CUSTOMISED AND INVENTED!

Inventors have long been tinkering with gadgets or inventing their own new ones, improving our scientific knowledge as well as creating their own work. Experiment with customising objects and create your own invention!

**11AM – 4PM**  
→ **SAT 18 MAR**

Whipple Museum of the History  
of Science, Free School Lane,  
CB2 3RH

**GENES AND HEREDITY**

Take part in activities to understand heredity, and discover how fruit flies are used to study genes.

**11AM – 4PM**→ **SAT 18 MAR**

Department of Genetics,  
Downing Site, CB2 3EH

**IT'S A MUDDY WORLD!**

Delve into geography and experience the magical mysteries of muddy coasts. Explore how, from tiny worms to cleverly adapted plants, muddy coasts support fascinating life forms, lock away carbon dioxide and protect us from flooding and erosion.

**11AM – 4PM**→ **SAT 18 MAR**

Department of Geography,  
Downing Site, CB2 3EN

**SCIENCE CAFÉ**

Take a break with scientists at Caffè Mobile! Spin the 'Wheel of Science' and chat about their research. Hot drinks and homemade cakes available for purchase.

**11AM – 4PM**→ **SAT 18 MAR**

On the lawn,  
Downing Site, CB2 3DZ

**SHIFTING LANDSCAPES**

Move mountains, restore rivers and 'water' wetlands by letting it 'rain' onto your very own mouldable landscape model. What will a changing climate and higher sea levels mean for your world?

**11AM – 4PM**→ **SAT 18 MAR**

Department of Geography,  
Downing Site, CB2 3EN

**WATER, WATER!**

Watch what happens when rising sea levels and raging seas come just a bit too close. This demonstration of coastal flooding in our laboratory flume may leave you high and dry but is sure to drown our mini villagers!

**11.30AM – NOON** Pre-book**12.15PM – 12.45PM****1PM – 1.30PM****2PM – 2.30PM****2.45PM – 3.15PM****3.30PM – 4PM**→ **SAT 18 MAR**

Meet at Small Lecture Theatre,  
Department of Geography,  
Downing Site, CB2 3EN

**MAKE AND TEST YOUR OWN MICROSCOPE**

The microscope is a window to the incredible 'small world' of life. Make your own simple microscope using your mobile phone to magnify and view this micro-world and submit your best pictures to our competition. Try out our lab microscopes, meet our scientists to discuss their latest research and find out how microscopy is pushing the boundaries of what can be observed.

**1PM – 4PM**→ **SAT 18 MAR**

Gurdon Institute, Tennis  
Court Road, CB2 1QN

**OH NO! MY PHONE HAS BEEN HACKED!**

Discover how easy it could be for an attacker to access your device and your personal data, and even watch you with your own camera if you don't follow basic cyber security rules.

**2PM – 5PM**→ **SAT 18 MAR**

Friends' Meeting House,  
12 Jesus Lane, CB5 8BA

**HANDS-ON AT THE GUILDHALL: ADULTS ONLY**

Our adult-only hands-on session returns again to the Cambridge Science Festival. Join us at the Guildhall to discover, discuss and debate science with our researchers without a child in sight!

Presented with MedImmune  
and AstraZeneca

**6PM – 8PM**

Pre-book

→ **SAT 18 MAR**

The Guildhall,  
Market Square, CB2 3QJ

Tickets available on the door

**FAMILY RETRO GAMING EVENING**

An evening of video gaming that you won't forget! A great chance for children, parents and carers to share experiences, compete against each other and talk about how technology and gaming have changed over the years.

**6PM – 10PM**

Pre-book

→ **SAT 18 MAR**

Centre for Computing History,  
Rene Court, Coldhams Road,  
CB1 3EW

£8 / £6 children / £7 students,  
carers and over 60s / £24 family  
(2 adults and 2 children) /  
under 5s free



# WHY FOOD REALLY MATTERS

**Jacqueline Garget**

Coordinator, Cambridge Global Food Security Strategic Research Initiative, University of Cambridge

We all need to eat food every day. In Britain our choice is huge and there's lots on offer to suit busy modern lifestyles. From pre-prepared veg, to sliced bread that stays fresh for a week, we expect convenience and availability. But where has our food come from and how was it produced? Are our choices sustaining a healthy lifestyle or making us ill?

## RELATED EVENTS

Our daily bread:  
what are we eating?

**5.30PM – 6.30PM**

**TUE 14 MAR**

**PAGE 10**

Inglorious  
fruit and veg

**6.30PM – 7.30PM**

**THU 16 MAR**

**PAGE 15**

The ways and means of providing the food we eat are complex, involving trade across the world and spanning farmers and growers, processors and suppliers. With a growing global population demand for food is rising, putting increasing pressure on water and energy resources and driving greenhouse gas emissions that contribute to climate change. Yet food is wasted in massive amounts and more people are obese than starving. The system is currently completely unsustainable.

So what can we do as individuals? We are all part of the global food system: as consumers of foods from around the world we make choices every day that influence not only our own health, but the health of the planet.

At this year's Cambridge Science Festival we will present the fascinating stories behind some of the foods we commonly eat.

## ↓ Sun 19 Mar

### HANDS-ON AT THE GUILDHALL: AUTISM-FRIENDLY HOUR

For one hour, our Guildhall hands-on space is open to adults and children who have an autism spectrum condition and their families. Join us to explore and discuss Cambridge science in a quieter and less-crowded space.

**11AM – NOON** Pre-book  
→ **SUN 19 MAR**

The Guildhall,  
Market Square, CB2 3QJ

### HANDS-ON AT THE GUILDHALL: SUNDAY SCIENCE

Join the Cambridge Science Festival at the Guildhall for another packed day of activities. See SATURDAY's entry for all the events taking place.

**NOON – 4PM**  
→ **SUN 19 MAR**

The Guildhall,  
Market Square, CB2 3QJ

### LOOK UP, LOOK DOWN, LOOK ALL AROUND!

Drop in for a self-guided exploration of the Museum using our new puzzle quiz and trail. Bring your smartphone or tablet and uncover the hidden treasures of the Museum in a self-guided tour produced by Historyworks. And venture beyond the Museum by foot or bike to find our specially produced geocaches.

**2PM – 5PM**  
→ **SUN 19 MAR**

Cambridge Museum  
of Technology, The Old  
Pumping Station, Cheddars  
Lane, CB5 8LD

Regular Museum entry fees apply  
Great for families

### EXPLORE AND SOAR!

Join Historyworks and Jonathan Austin for a workshop exploring flight. Take part in STEAM activities including designing, making and testing rockets and gliders, and experiment with the BBC micro:bit to measure the height of your rocket.

**3PM – 4.30PM** Pre-book  
→ **SUN 19 MAR**

Cambridge Museum  
of Technology, The Old  
Pumping Station, Cheddars  
Lane, CB5 8LD

Regular museum entry fees apply  
£3 suggested donation  
for the activity  
Great for families

## ↓ Mon 20 Mar

### PRIMARY ROCKET LAUNCHPAD

School groups from Years 5 and 6 are invited to the Department of Engineering to explore 3D geometry by making a rocket launchpad structure. The event finale is launching paper rockets with compressed air. Well-made rockets will land on our roof!

**10AM – NOON** Pre-book  
**1PM – 3PM**  
→ **MON 20 MAR**  
to **FRI 24 MAR**

Department of Engineering,  
Trumpington Street, CB2 1PZ

School groups of up to 30 pupils

### FRIENDS, ENEMIES, SCIENTISTS

Walk through Cambridge streets with Society of Cambridge Tourist Guides and become acquainted with some interesting characters from the City's scientific past: people who changed the lives of others with their discoveries, friendships, conflicts and unique personalities.

**10.30AM – NOON** Pre-book  
→ **MON 20 MAR**  
+ **WED 22 MAR**  
+ **FRI 24 MAR**

Meet outside the Whipple  
Museum of the History of  
Science, Free School Lane,  
CB2 3RH

## HANDS-ON



### ↓ Tue 21 Mar

#### **CURIOUS COLLECTIONS**

Your last chance to see the *Curious Objects* exhibition at the University Library. Drop in for a day of talks and tours exploring the nature of collecting and the links between quirky personal collections, cabinets of curiosity and scientific classification.

**10AM – 6.30PM**

→ **TUE 21 MAR**

Milstein Room, Cambridge  
University Library, West Road,  
CB3 9DR

### ↓ Wed 22 Mar

#### **UP CLOSE AND PERSONAL WITH PERSONAL COMPUTERS**

Personal computers have revolutionised our lives. But where did it all start and how have they changed over the years? Join us on this guided tour with our computing history experts to find out more.

**4.30PM – 5.30PM** Pre-book

→ **WED 22 MAR**

Centre for Computing History,  
Rene Court, Coldhams Road,  
CB1 3EW

£8 / £6 children / £7 students,  
carers and over 60s / £24 family  
(2 adults and 2 children) /  
under 5s free



### ↓ Thu 23 Mar

#### **WHAT'S IN A NAME? HIDDEN TALES OF BOTANICAL NOMENCLATURE**

Join Sally Pettit, Head of Horticulture, for a whistle-stop tour of the Botanic Garden and discover the stories behind the names of some of the Garden's most iconic plants. Discover the people behind the plants and find out why they have had plants named for them, all hiding in botanical nomenclature.

**2PM – 3.15PM** Pre-book

→ **THU 23 MAR**

Botanic Garden,  
1 Brookside, CB2 1JE

#### **GET FIT WITH THE MICRO:BIT!**

Find out how you can code the micro:bit to become your fitness assistant! Count the number of steps you've taken or design your exercise routine using this tiny device. Or simply use it as a stopwatch to get better at your sport.

**4.30PM – 6.30PM** Pre-book

→ **THU 23 MAR**

Centre for Computing History,  
Rene Court, Coldhams Road,  
CB1 3EW

£12 / £8 accompanying adult  
(required for under 14s)  
Ideal for teenagers

### ↓ Sat 25 Mar

#### **HOW WELL DOES YOUR BODY FUNCTION?**

Want to understand how well your body functions and how to improve your health and wellbeing? Come for a free health check.

**9AM + EVERY** Pre-book

**HALF HOUR**

until **4.30PM**

→ **SAT 25 MAR**

University of Cambridge Sports  
Centre, Philippa Fawcett Drive,  
CB3 0AS

#### **RESILIENCE, REPAIR AND RESEARCH**

Discover and witness how innovative conservation and digitisation techniques, materials and equipment are helping to preserve and share the personal stories of WWII civilian internees held in Changi Gaol, Singapore

**10AM – NOON** Pre-book

→ **SAT 25 MAR**

Milstein Room, Cambridge  
University Library, West Road,  
CB3 9DR



# LOSING AND FINDING THE SELF IN THE BRAIN

**Dr Jane Aspell**  
Department of Psychology,  
Anglia Ruskin University

I look forward to the Cambridge Science Festival every year and love meeting the inquisitive and enthusiastic audiences who help make it so much fun.

The theme of this year's Festival is very relevant to my own research: I'm a neuroscientist and I investigate how our brains can generate the most important thing in the world to us — our self!

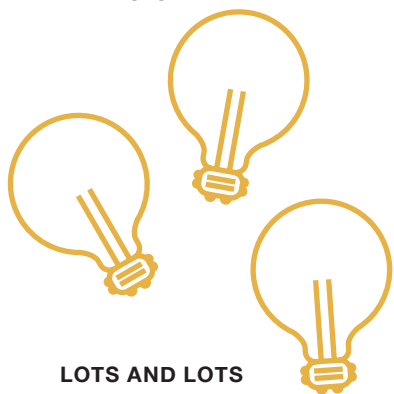
**SEE JANE'S EVENT:**

Losing and finding  
the self in the brain

**4PM – 5PM**  
**THU 16 MAR**  
**PAGE 14**

Most people think about personality, ego or character when they hear the word self, but rarely consider the most basic, physical aspect of the self — the body. In recent years neuroscientists, including myself, have created weird illusions — using simple virtual reality — that can briefly alter the experience of one's bodily self in profound ways. To understand things scientifically we usually have to perturb them!

In this year's talk I will discuss research on individuals who, because of brain damage, have unimaginably bizarre experiences of their self. There are patients who feel estranged from their own bodies, or who feel they are not living their own life, who do not recognise their own face in the mirror or their own arm lying at their side. Studying these fascinating patients can give us insight into how the brain creates a 'normal' sense of a self-inhabiting a body that most of us take for granted.



### LOTS AND LOTS OF LIGHT BULBS!

An opportunity for children aged 4–7 years old to discuss with scientists where electricity comes from, use their muscle power to generate their own electricity and light, and colour in their own convection-powered dragon, worm or snake to take home.

**10AM – 10.45AM** Pre-book

**11AM – 11.45AM**

**NOON – 12.45PM**

→ **SAT 25 MAR**

Department of Materials  
Science and Metallurgy,  
Charles Babbage Road,  
CB3 0FS

### HANDS-ON HEALTH SCIENCE AT THE VET SCHOOL

Ever wondered where epidemics come from? How do genes affect health and disease? How can scientists read and modify the code of the flu virus? Discover through talks and activities how vets and scientists work together to tackle the diseases that threaten livestock, wildlife and people.

**10AM – 11AM** Pre-book

**11AM – NOON**

**NOON – 1PM**

**1PM – 2PM**

**2PM – 3PM**

**3PM – 4PM**

→ **SAT 25 MAR**

Department of Veterinary  
Medicine, JJ Thomson Avenue,  
CB3 0ES

Great for families

### MATERIALS SCIENCE WORKSHOPS

Get hands-on with a wide range of fascinating materials science, physics and chemistry experiments.

**10AM – 2PM**

→ **SAT 25 MAR**

Department of Materials  
Science and Metallurgy,  
Charles Babbage Road,  
CB3 0FS

Great for families

### DISCOVERING HUMANITY THROUGH HUMAN EVOLUTIONARY STUDIES

Biological anthropologists at the Leverhulme Centre for Human Evolutionary Studies use cutting-edge science and archaeology to uncover our past. Explore our labs and collections, and join us for talks to discover more about the origins of humanity.

**10AM – 4PM** Pre-book

→ **SAT 25 MAR**

+ **SUN 26 MAR**

Leverhulme Centre for  
Human Evolutionary Studies,  
Henry Wellcome Building,  
Fitzwilliam Street, CB2 1QH

### OPEN HOUSE ON SCIENCE AND RELIGION

Visit the University Multi-Faith Chaplaincy Centre and meet staff from the Faraday Institute for Science and Religion, staff from the forthcoming Ely Cathedral Science Festival, and Muslim brothers and sisters who are interested in the interface between Islam and science.

**10AM – 4PM**

→ **SAT 25 MAR**

Merton Hall Farmhouse,  
JJ Thompson Avenue, CB3 0FD

### THE CHEMICAL TREE

Trees produce chemicals to protect them from predators, deter competing plants or mediate the effects of the weather. This walk lifts the lid on the hidden chemical world of trees, and reveals how humans have exploited some of these chemicals for our own benefit.

**10.30AM – 11.45AM** Pre-book

**1PM – 2.15PM**

**3PM – 4.15PM**

→ **SAT 25 MAR**

Botanic Garden,  
1 Brookside, CB2 1JE

### FRIENDS, ENEMIES, SCIENTISTS

Walk through Cambridge streets with Society of Cambridge Tourist Guides and become acquainted with some interesting characters from the City's scientific past: people who changed the lives of others with their discoveries, friendships, conflicts and unique personalities.

**10.30AM – NOON** Pre-book

**2.30PM – 4PM**

→ **SAT 25 MAR**

Meet outside the Whipple  
Museum of the History of  
Science, Free School Lane,  
CB2 3RH

### SCHOOLS ZONE

Students from schools and sixth form colleges are the experts today, showing what is happening in schools as part of their curriculum or after-school club. Don't miss these exciting demonstrations from the next generation of scientists, mathematicians and engineers.

**11AM – 3PM**

→ **SAT 25 MAR**

Hauser Forum, Charles  
Babbage Road, CB3 0GT

### TURBO-POWER: SEE HOW JET ENGINES AND TURBO-MACHINES WORK

See some of the exciting jet engine and gas turbine experiments we do at the Whittle Laboratory. Join us for activities that show how turbo-machines work and tours of our laboratories, including the chance to see one of the first steam-turbine engines.

**11AM – 4PM**

→ **SAT 25 MAR**

Whittle Laboratory,  
JJ Thomson Avenue,  
CB3 0DY

### MATHS PUBLIC OPEN DAY

From Isaac Newton onwards, some of the most famous mathematicians in history have been associated with Cambridge. Join staff and students from the Faculty of Mathematics to share the excitement of the subject through hands-on activities, games and demonstrations featuring everything from custard to cosmology!

**NOON – 4PM**

→ **SAT 25 MAR**

Centre for Mathematical Sciences, Wilberforce Road, CB3 0WA

### THE SCIENCE OF JEWELLERY

There's more to jewellery than the sparkle of diamonds and the shine of precious metal. Jeweller Harriet Kelsall explains the science and technology behind jewellery, from chemical gold testing to computer-aided design, and visitors can make their own science-inspired jewellery.

**NOON – 4PM**

→ **SAT 25 MAR**

The Betty and Gordon Moore Library, Centre for Mathematical Sciences, Wilberforce Road, CB3 0WD

### ENGINEERING ATOMS

Join the team from Engineering Atoms for an afternoon of activities to discover the materials used in jet engines, how we create them and what we can do to make them better.

**1PM – 4PM**

→ **SAT 25 MAR**

Department of Materials Science and Metallurgy, Charles Babbage Road, CB3 0FS

### CAVENDISH LABORATORY OPEN DAY

Physics experiments, demonstrations, our pop-up planetarium and CHaOS! Join us at the Cavendish Laboratory for Festival favourites and a host of new activities including drop-in Jenga for civil engineers and bridge building. Visit [outreach.phy.cam.ac.uk/scifest](http://outreach.phy.cam.ac.uk/scifest) for more information.

**1PM – 5PM**

→ **SAT 25 MAR**

Cavendish Laboratory, JJ Thomson Avenue, CB3 0HE

### ANTI-GRAVITY BOX

Step into a room like no other and have your world turned upside down! A unique experience for small groups to experience life where the rules of gravity appear to have changed completely!

**1PM – 5PM**

→ **SAT 25 MAR**

Cavendish Laboratory, JJ Thomson Avenue, CB3 0HE

### ESCAPE THE LAB: A PHYSICS ESCAPE ROOM GAME

An international crisis has occurred and this lab contains the only means of survival. But you're trapped in here, and running out of time. Can you escape and save the world? Pit your team against our physics-themed puzzles to discover the secrets and overcome the challenges!

**1PM – 1.45PM**

Pre-book

**2PM – 2.45PM**

**3PM – 3.45PM**

**4PM – 4.45PM**

→ **SAT 25 MAR**

Cavendish Laboratory, JJ Thomson Avenue, CB3 0HE

£10 per team of 4–6

### PHYSICS PROBLEM SOLVING WITH ISAAC PHYSICS

Trying to understand what happens using physics is much more than just plugging numbers into an equation. Join tutors from [isaacphysics.org](http://isaacphysics.org) and learn how to attack physics problems that go beyond A-level, but with no further knowledge required!

**1PM – 5PM**

→ **SAT 25 MAR**

Cavendish Laboratory, JJ Thomson Avenue, CB3 0HE

### SHINING LIGHT ON MEDICINE AND BIOLOGY

The Optical Society together with SPIR shows how amazing new light technologies can tell us how our body works.

**1PM – 5PM**

→ **SAT 25 MAR**

Cavendish Laboratory, JJ Thomson Avenue, CB3 0HE



**OPEN DAY AT THE INSTITUTE FOR MANUFACTURING**

The IfM opens its doors for the University of Cambridge Science Festival. Discover the exciting things that go on in here!

**Electricity and light in water**

Our inkjet experts reveal the fascinating ways in which they can manipulate water using light and electricity. See water bend, dance and even move upwards!

**Laser lab tours**

Get a glimpse of the latest laser technologies and find out how they are used in industry. Watch our experts show you how they can look into the invisible, hold and manipulate microscopic things using 'laser tweezers' and draw on a sparkler using a laser so fast that it won't even set it alight!

**Laser racing**

Fire your laser on a target to move along the track, and race your friend to see who can complete the course first!

**Steel #snap**

Have your group selfie etched onto steel using one of the IfM's high-powered laser markers.

**Sustainability games**

Fun and interactive lessons from our experts in industrial sustainability.

**What would you use that for?**

Try some of the latest science-based products from local companies and win a prize for thinking of the most original ways to use them!

**1PM – 5PM**→ **SAT 25 MAR**

Institute for Manufacturing,  
Charles Babbage Road,  
CB3 0FS

**OPEN AFTERNOON AT THE INSTITUTE OF ASTRONOMY**

The Institute of Astronomy opens its doors for an afternoon of hands-on activities, demonstrations, talks and displays all around our lovely wooded site. Meet the scientists and the telescopes, and learn more about astronomy and the research we do.

**2PM – 6PM**→ **SAT 25 MAR**

Institute of Astronomy,  
Madingley Road, CB3 0HA

↓ **Sun 26 Mar****MEET THE BIOMAKERS**

Tour the Biomakespace, a new community laboratory for Cambridge, enabling people with a curiosity for engineering with biology to collaborate and learn together. Whether you're interested in building sensors with DNA, printing cells, building microscopes and such like, get inspired with the biomakers.

**11AM – NOON**

Pre-book

**NOON – 1PM****1PM – 2PM****2PM – 3PM****3PM – 4PM**→ **SUN 26 MAR**

Bay 13, Clifford Allbutt Building  
Hills Road, CB2 0SP

**LOCAL WILDLIFE AT WANDLEBURY**

Find out about some of our local plants and animals. Learn how we try to monitor their numbers and increase biodiversity. Follow trails around the park.

**11AM – 3.30PM**→ **SUN 26 MAR**

Stable Rooms, Wandlebury  
Country Park, Wandlebury Ring,  
Gog Magog Hills,  
CB22 3AE

£3 car park fee

**“A great panel of experts and lively and engaging debate”**

2016 Festival attendee

**A PERSONALISED APPROACH TO CANCER RESEARCH**

Join scientists from the CRUK Cambridge Institute and MRC Cancer Unit to discover how cancer develops, grows and spreads. Get hands-on with games to build your own cell, identify mutations in DNA, and learn about early cancer detection and personalised treatments. Put on a lab coat, then isolate DNA or stain tissue samples and examine them under the microscope.

**11AM – 4PM**→ **SUN 26 MAR**

Cancer Research UK,  
Cambridge Institute,  
Robinson Way, CB2 0RE

# Hands-on science at the UTC open day

10.30AM – 4PM

→ SUN 26 MAR

UTC Cambridge,  
Robinson Way, CB2 0SZ

Explore some of the life-changing medical research conducted here in Cambridge. Discover how this research is translated into new treatments in our hospitals and the community, and new medicines from the pharmaceutical industry.

**All you can eat: why do we eat more than we should?**  
Join the Behaviour and Health Research Unit team to explore how seemingly small features of our environment may be shaping our diet.

**Cells up close**  
Our bodies contain trillions of cells, which are adapted for specialised roles in different tissues. Join researchers from the Cambridge Institute for Medical Research for hands-on activities that highlight the inner workings of cells and changes that result in disease.

**Clinical science: from bench to bedside**  
Have you ever wondered how scientists develop drugs? Join the MPhil in Clinical Science students as they journey from the lab to the clinic. Learn about the drug development process, chat with our students and try out medical and scientific equipment.

**Connecting with life at Papworth Hospital**  
Delve into a world full of discovery with Papworth Hospital, one of the largest heart and lung hospitals in Europe. Get up close and personal with a range of exciting activities that are saving people's lives at the hospital.

**Genomic revolution: it's in our DNA**  
How can we decode our entire personal genetic make-up? See how next-generation DNA sequencing combines engineering, chemistry, genetics and informatics to revolutionise the way we look at our DNA, and how genomics will revolutionise the way we diagnose disease.

**Getting personal with statistics**  
Join the MRC Biostatistics Unit and take part in activities that provide an exciting insight into why statistics is important and how it helps us to understand what is going on in the world.

**How to remember your medications**  
We know that taking medication can be daunting. Help researchers from the Behavioural Science Group design an automated telephone service that can help people take medication between visits to their GP.

**Human dynamo**  
Your body is a machine that converts the fuel you eat and drink into the energy you need to move, think or grow. Join metabolic scientists for hands-on activities and games, and take a closer look at how our bodies do their thing.

**Precision medicine**  
Join MedImmune and AstraZeneca scientists and have a go at experiments that demonstrate why different people need different medicines. Can you help us find the right medicine for the patient?

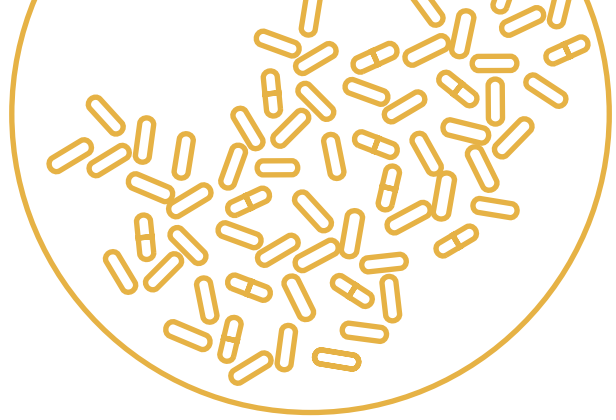
**Rising stars**  
Join our stars of the future as they introduce you to their research. Join us for interactive talks and performances, and be the first to try out some new hands-on activities.

**Stem cell robots**  
Stem cells are small, rare and amazing, as they can make all of the cells in the human body! But how do they decide which type of cell to become? Meet scientists from the Stem Cell Institute and our stem cell robots, and see if you can program yours to make the right choice.

**Up close and personal with fluorescent fruit flies**  
MRC Mitochondrial Biology Unit scientists use puzzles to show the techniques used to assemble millions of DNA sequences in the genetic diagnosis of patients with mitochondrial disease. They also demonstrate mitochondrial neurodegeneration through the behaviour of fruit flies.



UTC Cambridge is a state-of-the-art Academy School in Cambridge dedicated to delivering future scientists. See the College's facilities, find out about the innovative curriculum and roll up your sleeves to experience the excitement of science in the UTC Challenge Labs.



## The tale of the campus: from test tube to treatment

**The Cambridge Biomedical Campus is home to many things – two much-loved hospitals, world-leading pharmaceutical companies, prize-winning researchers and the University's School of Clinical Medicine, among many others. It's certainly a busy place, but do you know how it is working to improve the healthcare and treatments you receive?**

Where do you feel?

How do you think?

Mundipharma, Napp and Bard scientists help you discover how (and where!) you think and feel. Activities include neuron speed trials, sensitivity tests and making your very own brain hat to wear with pride!

Worms are cleverer than you think!

Be a worm neuroscientist! Find out how scientists at the MRC Laboratory of Molecular Biology use a tiny worm to understand how our neurons work, and what goes wrong in disease and ageing. Learn to move like a worm, and how worms use their senses, in our sweet-finding game.

Brain injury and patient inspired innovation

The NIHR Brain Injury Healthcare Technology Co-operative brings patients, carers, academics, engineers, doctors and nurses together with industry to develop innovative technology to prevent and treat brain injuries and their after-effects.

Take the opportunity to explore the Campus, from the Addenbrooke's Treatment Centre to Cancer Research UK's Cambridge Cancer Centre and the UTC. Across these buildings discover the science behind new medicines.

As well as talks aimed at the young and old, there will be lots of things to see and do. Take a tour of an operating theatre and drop in at the teddy bear clinic. Try your hand at surgery, wander through an inflatable colon and meet the wonderful medical detection dogs. Discover how blood cancers are diagnosed, understand the critical role of the pharmacy and find out how the Campus will develop in the future.

**11AM – 4PM**

→ **SUN 26 MAR**

Addenbrooke's Treatment Centre,  
Cambridge Biomedical Campus,  
CB2 0SL

For more information, please visit: [www.cuhp.org.uk](http://www.cuhp.org.uk)



# SEX, LIES AND BRAIN SCANS

**Barbara Sahakian**  
Professor of Clinical  
Neuropsychology,  
University of Cambridge

Can brain scans be used to reveal what really goes on in our minds? Studies have been done using functional Magnetic Resonance Imaging (fMRI) to 'read minds', detect lies or racial biases and study brain networks of morality.

**SEE BARBARA,  
JOHN, MOLLY AND  
JULIA'S EVENT:**

Sex, lies and brain scans:  
can scans reveal what goes  
on in our minds?

**7.30PM – 9PM**  
**MON 13 MAR**  
**PAGE 10**

For example, there are commercial companies which purport to detect lies using brain imaging. In addition, structural brain scans have been used for legal decisions by the court. What will the likely impact of these and other developments in neuroscience be on the law and issues of privacy of our personal thoughts? Furthermore, in patients thought to be in a persistent vegetative state, fMRI has been used to detect conscious brain activity. As our ability to read other people's thoughts improves, what are the ethical issues involved?

Understanding the social brain and how morality can be altered by technologies or drugs raises important neuroethical issues. The science of moral bioenhancement is in its infancy. In the future, will brain scans inform us as to which individuals have moral judgement?

Join us for a discussion at this year's Cambridge Science Festival on what brain scans can tell us now, what they will be able to tell us in the future and what the impact of this fMRI technology and novel developments in neuroscience will be on society.

Coming up next ↓

# CAMBRIDGE FESTIVAL OF IDEAS

Cambridge  
Festival of Ideas  
16 – 29 Oct 2017



[www.festivalofideas.cam.ac.uk](http://www.festivalofideas.cam.ac.uk)

For more information on other public events at the University of Cambridge, visit: [www.cam.ac.uk/whatson](http://www.cam.ac.uk/whatson)




Many Colleges and Museums across the City welcome visitors throughout the year. For further information, visit: [www.cam.ac.uk/visitors](http://www.cam.ac.uk/visitors)

# All Events











## THROUGHOUT THE FESTIVAL







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- Molecules that rocked the world  P.07

## PRE-FESTIVAL EVENTS














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present British Sea Scapes  P.37
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- Sounds of science  P.37
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- Get personal with your  
100 trillion microbiome friends  P.41

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a life in climate science  P.09
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- Astronomy through the ages  P.09
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- Cambridge Science Festival ceilidh  P.37
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- CHROMOS – zoom into the  
3D structure of our chromosomes  P.37
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- Conflict or mutual enrichment  P.10
- 
- Creativity and Curiosity:  
Artists and Astronomers  P.07
- 
- Embodied Science: where  
do you feel hunger in your body?  P.41
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- Exoplanets: on the hunt of Universal life  P.09
- 
- How to feel safe: or which infectious  
diseases are really going to kill you  P.10
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- John Adams: Games with the water horses  P.37

- See your baby's brain learn  P.41
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- Sex, lies and brain scans  P.10
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- The future of microprocessors  P.09
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- Your DNA, your say  P.09

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- Come and meet our EPIC researchers  P.11
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- Creativity and Curiosity:  
Artists and Astronomers  P.07
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- Creativity and Curiosity: Artists  
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- Danaus  P.38
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- Darwin's evolutionary tales  P.41
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- Getting to the heart of things  P.11
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- Inside out: how the gut changes  
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Space on Earth  P.11

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a climate change solution?  P.13

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The Variables present...  
an evening of science variety  P.38

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What works for India  
and Africa can work for the world  P.13

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Anatomy at the cutting edge  P.13


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Do our genes influence our behaviours?  P.13


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Exploring your mind and brain  P.42

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Hacking biology through time and space  P.13


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How did they do that?  P.42


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Is earlier necessarily better?  P.13


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Mini-me: how 3D organoids  
are revolutionising research  P.14


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Re-animating the nameless dead?  P.13


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Tackling climate change:  
whose responsibility is it?  P.14

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wandering rocks  P.41

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Better organs, better outcomes  P.15

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Bioanalyser systems  P.15


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Bug your bedroom  P.42


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Cambridge Climate Lecture Series  P.16


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Four years of Makespace: a showcase  P.42


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






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The Science Festival takes place over many venues with differing levels of accessibility. Everyone is welcome at the Festival and if you require specific access arrangements, please call: 01223 766766 or email: [csf@admin.cam.ac.uk](mailto:csf@admin.cam.ac.uk)

T Toilet, wheelchair accessible  
 S Step free  
 Li Lift to all floors  
 PA Partial access: phone or email to discuss your requirements  
 I Induction loop

<b>C3</b>	Addenbrooke's Treatment Centre	T   S   Li	<b>W6</b>	Hauser Forum	T   S
<b>54</b>	Alliance Française Cambridge	PA	<b>20</b>	Hidden Rooms	PA
<b>D10</b>	Anatomy Building	T   S   Li	<b>W4</b>	Institute for Manufacturing	T   S   Li   I
<b>41</b>	Anglia Ruskin University	T   S   Li   I	<b>W10</b>	Institute of Astronomy	T   PA
<b>39</b>	Anglia Ruskin University Young Street	T   S   Li   I	<b>05</b>	Institute of Continuing Education	T   S
<b>33</b>	Arts Picturehouse	T   S   Li   I	<b>04</b>	Isaac Newton Institute for Mathematical Sciences	T   S   Li   I
<b>28</b>	Babbage Lecture Theatre	T   S   Li   I	<b>17</b>	Jesus College	T   S   Li   I
<b>56</b>	Botanic Garden	T   S	<b>27</b>	King's College	T   S
<b>W1</b>	British Antarctic Survey	PA	<b>14</b>	Lady Mitchell Hall	T   S   Li   I
<b>58</b>	Cambridge Junction	T   S   Li   I	<b>49</b>	Leverhulme Centre for Human Evolutionary Studies	T   S   Li
<b>37</b>	Cambridge Museum of Technology	PA	<b>10</b>	Magdalene College Cripps Court	T   S   Li   I
<b>02</b>	Cambridge Regional College	T   S   Li   I	<b>43</b>	Makespace	T   S
<b>19</b>	Cambridge Union Society	T   PA	<b>D4</b>	Marquee on the lawn	S
<b>11</b>	Cambridge University Library	T   S   PA   I	<b>D3</b>	McDonald Institute for Archaeological Research	T   S   PA   I
<b>C2</b>	Cancer Research UK Cambridge Institute	T   S   Li	<b>W9</b>	Merton Hall Farmhouse	PA
<b>W7</b>	Cavendish Laboratory	T   S   Li   I	<b>23</b>	Michaelhouse Café	T   S   Li
<b>40</b>	CB2 Café	T   PA	<b>45</b>	Mill Lane Lecture Rooms	T   S   Li
<b>38</b>	Centre for Computing History	T   S	<b>57</b>	MRC Cognition and Brain Sciences Unit	T   S   Li   I
<b>03</b>	Centre for Mathematical Sciences	T   S   Li   I	<b>07</b>	Murray Edwards College	T   S   Li   I
<b>34</b>	Christ's College	T   S   PA	<b>15</b>	Museum of Classical Archaeology	T   S   Li
<b>06</b>	Churchill College	T   S   PA	<b>16</b>	Newnham College	T   S   Li
<b>C4</b>	Clifford Allbutt Building	Li   PA	<b>D7</b>	Physiological Laboratory	T   S   Li
<b>26</b>	Corpus Christi College McCrum Lecture Rooms	T   S   I	<b>12</b>	Robinson College	T   S   Li
<b>42</b>	Darwin College	T   S   Li	<b>55</b>	Sainsbury Laboratory	T   S   Li   I
<b>29</b>	David Attenborough Building	T   S   Li	<b>D2</b>	Sedgwick Museum of Earth Sciences	PA
<b>D8</b>	Department of Biochemistry	T   S	<b>21</b>	St John's College Fisher Building	T   S   Li   I
<b>32</b>	Department of Chemical Engineering and Biotechnology	T   S   Li	<b>22</b>	St John's College Old Divinity School	T   S   Li   I
<b>52</b>	Department of Chemistry	T   PA	<b>09</b>	The Boathouse	T   S
<b>D1</b>	Department of Earth Sciences	T   PA	<b>25</b>	The Guildhall	T   S   Li
<b>50</b>	Department of Engineering	T   S   Li	<b>51</b>	The Polar Museum	T   S   Li
<b>D6</b>	Department of Genetics	T   S	<b>08</b>	The Portland Arms	PA
<b>D11</b>	Department of Geography	T   S	<b>44</b>	University Centre	T   S   Li
<b>W2</b>	Department of Materials Science and Metallurgy	T   S   Li   I	<b>W3</b>	University of Cambridge Sports Centre	T   S   Li   I
<b>D12</b>	Department of Pathology	T   S   I	<b>C1</b>	UTC Cambridge	T   S   Li
<b>D5</b>	Department of Plant Sciences	T   S	<b>60</b>	Wandlebury Country Park	T   S   PA
<b>D9</b>	Department of Psychology	T   S   Li   I	<b>59</b>	Wellcome Genome Campus Conference Centre	T   S   Li
<b>W5</b>	Department of Veterinary Medicine	PA	<b>35</b>	Wesley Methodist Church	T   S   I
<b>30</b>	Department of Zoology	T   S	<b>13</b>	West Road Concert Hall	T   S   I
<b>46</b>	Emmanuel United Reformed Church	T   S	<b>31</b>	Whipple Museum of the History of Science	T   S   I
<b>48</b>	Fitzwilliam Museum	T   S   I	<b>W8</b>	Whittle Laboratory	T   S
<b>18</b>	Friends' Meeting House	T   S	<b>53</b>	YHA Cambridge	T   S   I
<b>01</b>	Girton College	PA			
<b>36</b>	Grafton Centre	T   S   Li			
<b>24</b>	Great St Mary's	T   S   I			
<b>47</b>	Gurdon Institute	T   S   Li			



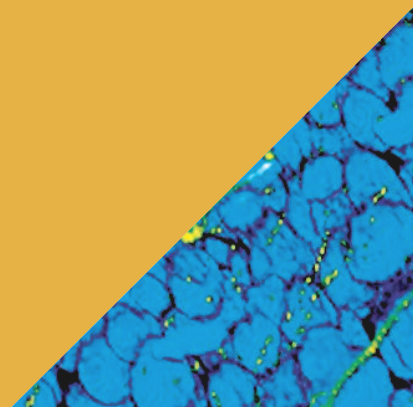
The Cambridge University Disability  
Access Guide is available at:  
[www.cam.ac.uk/disability](http://www.cam.ac.uk/disability)

For enquiries or to pre-book, visit:  
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Bookings open:  
Mon 20 Feb 2017

Lines open:  
10.30AM – 4PM  
Mon – Fri

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#### Cover Image

Saskia Suijkerbuijk, Piddini Laboratory,  
Gurdon Institute, University of Cambridge.  
Tree of life — 3D reconstruction of *Drosophila*  
adult posterior midgut. The oxygen-supplying  
trachea is shown in yellow and nuclei in of  
the gut epithelium in blue.