

EDINBURGH INTERNATIONAL



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SCIENCE FESTIVAL

5–20 APRIL 2014



ONLINE BOOKING: www.sciencefestival.co.uk

BOOKING HOTLINE: 0844 557 2686

WITH SPECIAL THANKS TO ALL OUR PARTNERS

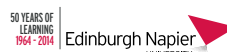
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The Edinburgh International Science Festival is produced annually by the Edinburgh International Science Foundation, an educational charity whose mission is to inspire, encourage and challenge people of all ages and backgrounds to explore and understand the world around them. We couldn't achieve this without the support of our funding partners, who allow us to engage with more than a quarter of a million people every year.

TRUSTS AND FOUNDATIONS

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WITH THANKS

Apache
City of Edinburgh Council – Building Stronger Town Centres and supporting Economic Development throughout Edinburgh
MAKlab
The James Hutton Institute

SCIENCE FESTIVAL 2014

Our vibrant 2014 programme explores how science lies at the heart of everything with an entertaining and engaging series of events, exhibitions and happenings. Ranging from family workshops and shows to thought provoking discussions and debates and even a few big nights out.

From the complexity of our bodies and minds to the food we eat, clothes we wear, games we play and the music that provides the soundtrack to our lives – science is everywhere. Starting with the personal and moving outwards to view the bigger picture, take a fascinating journey through some of the ways in which we are all undeniably and irrepressibly connected to science and technology.

Check out our programming highlights on pages 4 and 5 and join our unique celebration of science at the heart of... Edinburgh.

HOW TO USE THIS BROCHURE SCIENCE FESTIVAL FAMILIES (P6–27)

Our programme of events and days out suitable for families are listed by venue. To ensure the best possible experience for all our visitors, most events carry a minimum age recommendation. We ask parents to bear these in mind when choosing events for their children.

SCIENCE FESTIVAL EVENTS (P28–57)

Science Festival Events is our programme of discussions, debates, workshops, screenings and nights out with a scientific twist. The programme is designed for visitors aged 14+. This is a recommendation only and younger audiences are very welcome.

However, please note that a small number of events have an enforced age limit of 18+. These will be marked with AGE 18+ next to the listing. This restriction is in place due to event content and/or venue licensing laws. Identification will be required and under 18s will not be admitted under any circumstances.

FIND US ONLINE

Find Edinburgh International Science Festival on Facebook and connect with us on Twitter @EdSciFest for festival information and exclusive ticket offers.

HOW TO BOOK ONLINE

sciencefestival.co.uk

PHONE

0844 557 2686

Thursday 13 February–Friday 4 April:

10am–6pm (Monday–Friday)

11am–5pm (Saturday)

Saturday 5 April–Sunday 20 April:

8.30am–6pm (Monday–Saturday)

11am–4pm (Sunday)

Please note: a handling fee of £1.50 per transaction will apply to phone and online bookings.

IN PERSON

Edinburgh Festival Fringe Shop

180 High Street, Edinburgh, EH1 1QS

10.30am–5.30pm (Monday–Friday)

11am–5pm (Saturday)

If tickets for your event are available, they can be purchased from the venue 30 minutes prior to the start.

BOOKING INFORMATION

Book early for some great offers at the City Art Centre [p.10] and on Science Festival Events [p.29].

CONCESSIONS

Available for pensioners, the unemployed, disabled persons and their personal assistants, and students unless otherwise stated. Proof of status may be required.

STUDENTS

This year, we're offering a special half price ticket rate for students – enjoy a lunchtime talk for just £2.50 or an evening out for as little as £4. Not valid on every event, see individual entries for price information. Advance booking is recommended as half price tickets are subject to availability.

GROUP DISCOUNTS

We welcome groups to the Science Festival and discounts are available depending on the event and party size. Please call the Box Office on 0844 557 2686 to discuss your needs.

REFUNDS

All Science Festival tickets are non-refundable, except in the case of cancellation.

Science at the heart of...



EASTER HOLIDAYS

During the school holidays, the Science Festival provides exciting, engaging and educational activities the whole family can enjoy. Our flagship venue at City Art Centre is full of the unique immersive workshop experiences that have made us a world leader in our field. Children can operate real surgical tools in *ER* [p.9], become forensics analysts in *CSI* [p.10] and race against the clock to stop a cyber attack in *Code Crackers* [p.10]. Over at the National Museum of Scotland, we're celebrating maker culture with a new interactive showcase *Making It...* [p.12] while our new festival hub at Summerhall hosts the *Making It...* workshop programme [p.22–24] (details in Making Things). Add to that a series of shows and performances covering everything from *Science of Vampires* [p.21] to the genetics of superheroes, and there really is something for everyone.



LUNCHTIME

Snack on some science in your lunchbreak with hour-long sessions that let you get your teeth into some truly fascinating topics. *Food for Thought* serves up fascinating bite-sized servings from the authors of Oxford University Press' popular *Very Short Introduction to...* series covering everything from anxiety to the Ice Age and physical chemistry to fractals. *Healthy Lunches* sees us explore the important health-related topics of heart disease, Alzheimer's disease, multiple sclerosis and stroke. Throughout the Festival – see pages 30–57.



EVENINGS

Enjoy a night out with a scientific twist in some of Edinburgh's most inspirational venues. We'll be opening City Art Centre for a very special *Lates* [p.30] event on 3 April to celebrate our Festival opening while continuing our collaboration with New Media Scotland to present *LateLab* [p.31]—a wunderkammer of talks, performances, interactives and installations happening throughout the Festival at The University of Edinburgh's Informatics Forum.

Our new Science Festival hub at Summerhall offers events on everything from fashion to fiction, and even a *Science Ceilidh* [p.51] (with Festival favourite **Peter Lovatt** AKA Dr Dance). All served up with a special Science Festival beer brewed by Summerhall's resident microbrewery Barney's Beer. Throughout the Festival — see pages 30–57.

READING

Immerse yourself in the world of science writing in all its richly diverse forms. Celebrating the spaces where the worlds of science and words collide, and acknowledging the power of each, *The Reading Experiment* [p.37] will encourage you to engage anew with science writing of all sorts — from popular science to poetry, literacy fiction to sci-fi; the range is broader than you might think.

Throughout the Festival we're working with literary types from across the city to host author talks, workshops and other special events that explore the creative nexus between science and words.

Look out for *The Reading Experiment* from pages 30–57.

MAKING THINGS

This year's Festival is a celebration of maker culture. *Making It...at the Museum* [p.12], will take centre stage in the Grand Gallery of the National Museum of Scotland with a series of purpose-built interactive pods showcasing everything from 3D printing to open source architecture. Inspired by this, budding inventors, makers and crafters should head straight to *Making It...at Summerhall* [p.19], for a series of hands-on workshops for the whole family. Led by expert makers from around the UK, these sessions will give you the chance to learn the basics of coding, make your own animation, programme an Arduino and design your own t-shirt. And just when you thought we couldn't make any more... the day-long extravaganza that is the *Edinburgh Mini Maker Faire* [p.53] will close the Festival by filling Summerhall with novel gadgets, ingenious inventions and their inventors.



FOOD

A mini festival of the science of food and drink, *GastroFest* [p.33] showcases the importance of science in our lives in the most delicious way possible — through a smorgasbord of insightful talks, out-of-this-world dining experiences and a special science-themed farmers' market. Take a trip through the science of intoxication at the *Mad Hatter's Tea Party* [p.32], sample delicious foods with science secrets at our *Feast of the Commonwealth* [p.44] gala dinner with a menu created by chef **Neil Forbes**, or join creative catering wonders **Jelly & Gin** for an evening of extraordinary dining in *Sensation* [p.33]. Look out for *GastroFest* events from pages 30–57.

POLITICS

One of the most important decisions in our nation's history will be taken this September, when Scotland goes to the polls to determine its future. In a series of fascinating and eminently topical debates, *Scotland Decides* [p.35] brings scientists, politicians, academics and the public together to discuss and envision the shapes this future could take. Healthcare, energy, research and innovation, funding and the psychology of choice all come under the microscope as we combine expert input with good old-fashioned debate.

Look out for the *Scotland Decides* series — pages 30–57.

ART

Science is as much a part of culture as the arts, and scientists and artists have more in common than many people think. All seek to explain the world around us and our place in it and the meeting of the two can convey some truly cosmic ideas. We celebrate this fertile interface with a programme of visual art, literature and poetry, comedy, drama and music that showcases creativity in all walks of life. A series of specially curated exhibitions and installations put *Science at the HeART* of Summerhall [p.31]. *LateLab*, [p.31] *Making It...* and *Edinburgh Mini Maker Faire* [p.53] explore the spaces where art meets science and technology and our special discussions bring scientists and artist together to explore their shared creativity. If there is still barbed wire between the two cultures we plan to help tear it down once and for all.

Throughout the Festival — see pages 27–57.

Image: Berengo Studio *Dress of Glass and Flame* by Helen Storey, 2013



City Art Centre

Open daily Saturday 5–Saturday 19 April (not Sundays)
9.30am–4.30pm

During the Science Festival, we transform Edinburgh's City Art Centre into a science playground packed full of workshops, shows and interactive events.

HOW TO BOOK

A Day Pass gets you into City Art Centre to explore as many events as you like. The events are a mixture of bookable and drop-in sessions. Pre-booking your Day Pass and a selection of bookable events is strongly advised to avoid queues and disappointment.

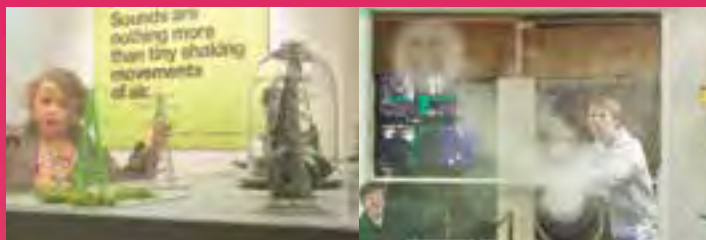
VENUE SPONSOR

Wolfson Microelectronics is passionate about science and technology and is thrilled to continue its support of the Science Festival at City Art Centre. Edinburgh-based Wolfson develops ground-breaking ultra-low power audio solutions for some of the world's highest profile consumer electronic products, with customers including Samsung, Microsoft, Sharp and LG.

wolfsonmicro.com



WORKSHOPS FOR ALL AGES



ART ON SHOW

Art-science collaborative ASCUS draws inspiration from our 2014 programming theme – Science at the Heart of Things – to create an interactive and engaging exhibition across all floors of the City Art Centre.

drop-in

FROM RUSSIA WITH SCIENCE

The All-Russia Science Festival joins us for the first time with an interactive offering from a band of intrepid Russian students. Take everyday materials, look at them a bit differently and see what fun games and cute – but smart! – toys emerge. Get jiggy with non-Newtonian fluids, move computer objects with your voice and learn what snakes and woodpeckers are doing here... Fire a vortex cannon, bottle a tornado and even create your very own black hole. You might even get an All-Russia Science Festival award in the process!

5–7 April • drop-in

Presented by the All-Russia Science Festival





CHAIN REACTOR

This machine is quite simply bonkers. It's 10 metres of unstoppable reactions as the wonders of chemistry are revealed in a procession of knock-on effects. Stay behind the Danger Line as acids splash and alkalis flow and if you're very lucky, you'll get to start the whole process using the spectacular Toroidal Vortex Generator.

drop-in



COSY COSY GAME SHOW

A game show for parents and children in which we challenge you to work out how to stop heat leaking from model houses. Play the game against the clock and try to beat those around you by saving the most energy – and money!

drop-in



MANIC MONSTER HUNT

Get your hands on the world's best video technology used in surveillance operations, control the equipment and hunt for monsters hiding around the building. Watch where you step though, you are being watched.

drop-in



THE BRAIN GAME

The human brain is the most complex living structure on Earth. Each one contains around 86 billion cells – over ten times the number of people on the planet. Come and find out more about the workings of this amazing organ and how it is affected by dementia with a range of memory games and hands-on challenges for children and adults.

8–19 April · drop-in

Supported by



Supported by



Supported by



IndigoVision

Supported by



SCIENCE MINI CINEMA

Our science mini cinema screens a series of short films and documentaries from around the world. Sit down, relax and enjoy.

drop-in



WORLD OF BUBBLES

Step into a wonderful world of bubble magic and prepare to be amazed... Discover the perfect bubble mixture and design your own bubble wands to create some unexpected and jaw-dropping shapes. Catch a beautiful smoke-filled bubble, stand inside a giant bubble and even make a round bubble square.

drop-in

Supported by



Supported by



WORKSHOPS FOR AGES 3+



NINA AND THE NEURONS

Inspired by experiments from the CBeebies show, *Nina and the Neurons Earth Explorers*. Prepare to have fun while you find out more about the science that is all around us.

drop-in

Please note: Nina will not be present at the workshops.



OASIS ISLAND

Come and explore *Oasis Island*, our special space for smaller scientists. Build your very own colour wheel or create a spinning picture toy, all on the deck of our science boat.

drop-in



STORYTIME TENT

Snuggle into the *Storytime Tent* where our Storytelling Scientists are waiting to take you on adventures to amazing new worlds. Join in and discover where your imagination can take you!

10am–4pm (half-hourly) 20 mins

BOOKABLE

Presented by



WORKSHOPS FOR AGES 5+



RAMPAGING CHARIOTS RACE

Race a powerful robot around a challenging obstacle course then pitch your skills against your opponent in our Robot Football Champions League.

drop-in



SPLAT-TASTIC

This interactive workshop invites you to get creative with chemistry and design your very own slime. Test its thickness and stickiness under the extreme conditions of our 'Splat-o-Meter' and perform high impact investigations into how the appearance and properties of materials can change when a chemical reaction takes place.

10am–4pm (hourly) 45 mins

BOOKABLE

Presented and supported by



all included
in your
day pass



WORKSHOPS FOR AGES 5+

**ENERGISE!**

Energise! is packed full of high energy, interactive activities to keep you fighting fit. Journey through a giant digestive system as we explain basic human biology and what impact the food you eat has on your body. Find out what you can do to stay healthy in this energising exploration of how the body works.

10am–4pm (half-hourly) 20 mins

BOOKABLE

Developed in partnership with
Diabetes UK Scotland

**JUNGLE SAFARI**

Put on your safari gear and embark on an incredible and memorable journey through the deepest, darkest regions of the jungle. Our team will help you discover the fascinating world of animal communication and learn more about the amazing range of sounds the creatures of the jungle make.

10am–4pm (half-hourly) 45 mins

BOOKABLE

Please note: this workshop is closed with no viewing area for parents.

**PHOTOLAB**

Create and develop your own beautiful picture to take home by arranging unusual objects on a glass plate and exposing the pattern on to a piece of photographic paper in the dark room. Chemistry has never been so cool.

drop-in

Supported by



WORKSHOPS FOR AGES 7+

**ER**

Emergency, emergency – there's been an accident! This is your chance to scrub up and save lives. Meet your 'patient', identify what's wrong and let a surgeon help you operate using endoscopes supplied by Karl Storz. Learn the medical names for parts of the body and discover the tools a surgeon needs to do their job.

10am–4pm (hourly) 45 mins

BOOKABLE

Please note: this workshop is closed with no viewing area for parents.

**MINI SCIENTISTS**

Pull on your lab coat, pick up your notebook and step into our lab to become a mini scientist. Our Medical Research Council team will help you to learn about DNA, race to match chromosomes, build a cell to take home, create a new flu virus, find ways to make a city healthier and solve hearing problems.

10am–4pm (hourly) 45 mins

BOOKABLE**PONGY POTIONS**

Prepare your nostrils for some of the stinkiest smells imaginable, and design your own sweet-smelling perfume (but please leave your natural stinks at home!). Test your senses in our blindfold taste challenge and uncover the secrets of the science of scent. Can you blend smells to create a nasal nirvana?

10am–4pm (hourly) 45 mins

BOOKABLE**VISUAL-EYES**

Explore your eyes – inside and out. Peek inside our giant eye to see how eyes really work. Dissect eyeballs and play with lenses to uncover the secrets of vision. Learn about all the different parts of your eye and what they do.

drop-in

Supported by



Presented and supported by



WORKSHOPS FOR AGES 8+



ADVENTURE BOTS AND THE TEMPLE GODS

Using a specially designed version of LEGO MINDSTORMS NXT technology, build and programme robots, outsmart temple gods, battle deadly snakes and search for hidden treasure. Take part in a robotics adventure like no other.

10am–4pm (hourly) 45 mins

BOOKABLE



BLOOD BAR

Prepare to be grossed out at the *Blood Bar* as you make your own scabs, mix up a gooey blood clot and even touch a real heart. Explore the science of blood and see how we can diagnose disease with some cutting-edge technology. Take a closer look at the heart, lungs and oxygen in *Don't Hold Your Breath*, and find out what really happens when we get cuts and bruises in the *Scab Lab*.

drop-in



CODE CRACKERS

Enter the cyberbunker – a hi-tech hub where you'll crack codes, crunch data and find out how security agencies protect you from online crime. As part of a digital security team, this code-breaking mission will open your eyes to a hidden world of intrigue and enigma.

10am–4pm (hourly) 45 mins

BOOKABLE

Please note: this workshop is closed with no viewing area for parents.



CSI: CRIME SCENE INVESTIGATION

A crime has been committed; can you help us solve it? Become a forensic scientist in our special *Crime Scene Investigation* workshop. Study the crime scene and decipher the clues left behind by finding fingerprints, identifying soil samples and investigating blood. Can you solve the mystery and help us catch the criminal?

10am–4pm (hourly) 45 mins

BOOKABLE

Please note: this workshop is closed with no viewing area for parents.

Supported by



CITY ART CENTRE OPENING HOURS

Saturday 5–Saturday 19 April
(not Sundays)
9.30am–4.30pm
Allow 4–5 hours for your visit

FACILITIES

Packed lunch area, secure buggy park, cloakroom, toilets, baby changing, café and shop

DAY PASSES

Adult	£7
Adult concession	£6.50
Child aged 7+	£9
Child aged 3–6	£6.50
Child under 3	FREE
Registered unemployed	£5
	(for each family member up to 6 people. ID required)

EARLY BIRD BOOKING

City Art Centre Weekends
Book over the phone or in person before 29 March and get £1 off all children's Day Passes on Saturday 5 April, Saturday 12 April and Saturday 19 April. Children must be accompanied by an adult.

BOOKABLE EVENTS

Many of our events are available to drop into during your visit. However some do have a limited capacity and should be booked in advance. You can reserve up to three workshops per child's Day Pass purchase. Please use the schedule to plan your day.

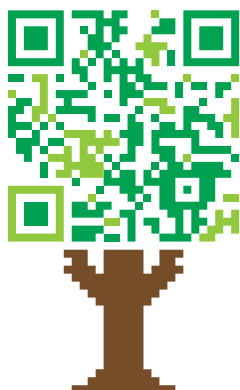
We would ask you to keep this schedule and the minimum age recommendation in mind when selecting workshops for your child.

GIFT AID SCHEME

The Edinburgh International Science Foundation, which runs the Edinburgh International Science Festival, is an educational charity and all ticket prices for City Art Centre events include a 10% donation. This allows us to reclaim the tax you pay to visit through the Gift Aid Scheme – every pound you pay is worth £1.25 to us. These donations help make the Science Festival accessible to those on lower incomes. If you are not a UK taxpayer or do not wish to make a charitable donation, the admission prices for the City Art Centre are as follows: adults (£6.36), adult concessions (£5.90), child aged 7+ (£8.18), child aged 3–6 (£5.90).

A CLEANER, GREENER FESTIVAL

Please use public transport when visiting the City Art Centre. Show us your bus or train ticket (or your bike!) when you arrive and receive a Science Festival gift. See pages 59 and 60 for public transport information.



LET'S GO GREENER TOGETHER.
GREENERSCOTLAND.ORG

giftaid it



POLYFLOSS FACTORY

Step into the *Polyfloss Factory* where we need workers to help out in our plastic reprocessing plant. Many of the objects we use every day are made from plastic – from bottles to TVs, furniture to clothing, plastics are used to create all sorts of useful stuff. We'll be sorting out waste plastic, melting it down in our amazing polyfloss machine and creating brand new, funky recycled objects to take home.

drop-in

RAMPAGING CHARIOTS WORKSHOP

Race a powerful robot round a challenging obstacle course. Once you've seen what a robot is capable of, build your own in a special workshop where you will learn how to construct, design and build a *Rampaging Chariot* from scratch. Once driven, never forgotten!

10am–3pm (hourly) 45 mins

BOOKABLE



Presented and supported by



AGES		START TIMES															
		10.00	10.30	11.00	11.30	12.00	12.30	1.00	1.30	2.00	2.30	3.00	3.30	4.00	4.30		
3+	STORYTIME TENT 20min																
	SPLAT-TASTIC 45min																
5+	*JUNGLE SAFARI 45min																
	ENERGISE! 20min																
	MINI SCIENTISTS 45min																
7+	PONGY POTIONS 45min																
	*ER 45min																
	ADVENTURE-BOTS 45min																
8+	RAMPAGING CHARIOTS 45min																
	*CSI 45min																
	*CODE CRACKERS 45min																

* these workshops are closed with no viewing area for parents.



Open daily Saturday 5–Sunday 20 April
10am–5pm

FAMILY EVENTS

Open daily from Saturday 5–Sunday 20 April,
between 10am and 5pm.

This spring, Edinburgh International Science Festival returns to the National Museum of Scotland to bring science to life with a brand new interactive showcase: *Making It... at the Museum* and a series of engaging and entertaining workshops, talks, presentations and demonstrations which the whole family can enjoy.

MAKING IT... AT THE MUSEUM



This brand new interactive display created by Edinburgh International Science Festival takes centre stage in the National Museum of Scotland's Grand Gallery for this year's Festival.

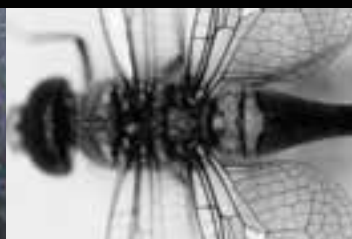
Making It... gives you the chance to immerse yourself in accessible technologies and discover the maker movement. And there are lots of demonstrations and things to do: from 3D printing to giant drawing machines, and from electronics to DIY biology.

Entrance to *Making It... at the Museum* is free



CREATE...

a unique collaborative sculpture of model molecules in *Making Matters*



SNAP...

your own photos using our ingenious smartphone microscopes in *Making Life*



image: The Sugar Lab

PRINT...

the Museum! Watch our 3D printers make models of the National Museum of Scotland's most intriguing artefacts in *Making Shapes*



PEEK...

inside cutting-edge sensors and our mysterious eyeball tracking device in *Making Sense*

MAKING IT... AT SUMMERHALL

Budding inventors, makers and crafters should head straight from *Making It... at the Museum* to our series of *Making It...* workshops at Summerhall, led by experts from all over the UK.

Become a maker yourself as you learn the basics of coding, make your own animation, programme an Arduino or design your own screen-printed t-shirt.

See page 22–23 for full workshop details

image: The Sugar Lab

EXHIBITIONS



MAMMOTHS OF THE ICE AGE

ALL AGES

Journey back in time thousands of years to discover the animals of the Ice Age. Joust with mammoth tusks, find out what their fur felt like and touch the replica teeth of a colossal mastodon. Then meet Lyuba, a detailed replica of the 42,000 year-old baby woolly mammoth discovered in Siberia in 2007, and learn why early humans both hunted and honoured these majestic animals.

Friday 24 January–Sunday 20 April
Adults £9/£7.50, Child £6 (under 5s Free)
Family of 4 £25, Family of 3 £19
National Museum of Scotland, Exhibition Gallery 1

This exhibition was created by The Field Museum, Chicago



WILDLIFE PHOTOGRAPHER OF THE YEAR

ALL AGES

Through the lens of wildlife photography this exhibition captures the intrigue and beauty of our planet. These awe-inspiring images, selected from 43,000 entries by amateur and professional photographers from 96 countries, give us a glimpse of the natural world as it has never been seen before.

Monday 17 March–Sunday 1 June
Free • National Museum of Scotland, Exhibition Gallery 2

Wildlife Photographer of the Year is co-owned by the Natural History Museum and BBC Worldwide. Image: © Hannes Lochner
 Also join us after the Festival for fun family activities inspired by the exhibition happening over the May bank holiday weekends.

WORKSHOPS



LAB RATS: MAMMOTH POO DETECTIVES

AGES 4+

The Lab Rats scientists are using poo clues to track down mammoths and mastodons. Explore Ice Age environments through demonstrations and hands-on messy challenges. Perfect for children aged 4–7.
Monday 7–Friday 11 April • 11am, 12pm, 2pm, 3pm (45 mins) • Free (Limited spaces. Sign up on the day with your adult helper)
• National Museum of Scotland, Learning Centre Level 4

Presented by the National Museum of Scotland

ICE, ICE BABY...

AGES 3 AND UNDER

Bring your little ones to sensory science story sessions inspired by our *Mammoths of the Ice Age* exhibition.
Monday 14–Friday 18 April
10.30am, 11.30am, 2.30pm, 3.30pm (30 mins) • Free (Limited spaces. Sign up on the day with your adult helper)
National Museum of Scotland, Learning Centre Level 4
 Presented by the National Museum of Scotland



The Scottish Government
 Riaghaltas na h-Alba

Making It... was developed with support from the Scottish Government's Edinburgh Festivals Expo Fund



Engineering and Physical Sciences Research Council

Creative partner: MAKLab

FAMILY EVENTS FROM THE UNIVERSITY OF EDINBURGH

Discover science with real scientists from The University of Edinburgh. Visit the National Museum of Scotland Learning Centre for free, family-friendly drop-in activities, workshops and shows from 5–19 April.

Drop-in activities for the whole family (suitable for those aged 5+) run from 10am–4.30pm daily.



THE UNIVERSITY
of EDINBURGH

DROP-IN ACTIVITIES



CELEBRATING THE HIGGS BOSON

Edinburgh is proud that Prof Peter Higgs was recently awarded the Nobel Prize for his work in discovering a tiny particle called the Higgs Boson. Chat with our particle physicists to find out what all the fuss is about, detect cosmic rays and drive a particle accelerator!

Thursday 10–Monday 14 April • (drop-in)
Free • Level 2



CRYSTAL CHEMISTRY

Help our chemists celebrate International Year of Crystallography! Crystals are all around us but how are they made and why are they useful? Grow your own crystals, look at these fascinating structures under the microscope, and discover how crystals can help us understand our world.

Thursday 10–Monday 14 April • (drop-in)
Free • Level 2



POP-UP ENGINEERING

Pop-ups may look simple, but they are ingenious engineering mechanisms. Choose your favourite design, transform it from a flat cardboard shape to a magical 3D model, and then decorate it with your own personal touch to take home.

Thursday 10–Monday 14 April • (drop-in)
Free • Level 2



THE SCI-FUN ROADSHOW

Join the fun and take part in more than fifty incredible interactive science activities. Control lightning, see a hole in your hand, solve a crime, separate (fake!) blood, become part of a human circuit and relax in our spinning chair. Pop in for a moment and stay for hours!

Thursday 10–Monday 14 April • (drop-in)
Free • Levels 2 and 4

WORKSHOPS



CAN YOU KEEP A SECRET?

AGES 7+

Who are the best people to be friends with if you want to learn a secret? And why do your pals seem to have more friends than you? Maths has the answers! Explore the maths of how rumours spread and whether you could be relied on to keep a secret. Perfect for children aged 7–14.

Sunday 6–Tuesday 8 April • 11.30am and 2pm (1 hour) • Free (ticket required)
Level 4 Studio



CHOCOLATE ALCHEMY

AGES 9+

Calling all chocolate chemists – did you know that the chemical structure of a substance affects its properties? When chocolate is melted and re-hardened it crystallises into a different molecular structure. Carry out experiments with chocolate to discover changes in texture and taste!

Thursday 10–Monday 14 April • 3pm (1 hour)
Free (ticket required) • Level 4 Studio



FARM DETECTIVES

AGES 10+

There's an outbreak of disease on the farm but what's the cause and how can we stop it? Be a veterinary scientist for the day and help fellow scientists from The Roslin Institute to investigate what the disease is, where it came from and how it can be treated. Perfect for children aged 10–14.

Tuesday 15–Friday 18 April • 11.30am and 2pm (1 hour) • Free (ticket required) • Level 4 Studio

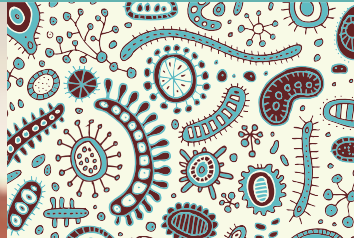
DROP-IN ACTIVITIES



BIO-DISCOVERIES

Find out what our amazing fruit flies have been doing in the name of genetic science over the past year, and what other new and exciting discoveries our biologists have made. Then take your turn at the microscope to see what you can find.

Saturday 5–Wednesday 9 April • (drop-in)
Free • Level 2



INFECTIOUS MATHS

What secret symmetries lie in the shape of a virus? Play Jekyll and Hyde – use maths to design your own evil virus and then see if you can stop it from destroying the world...

Saturday 5–Wednesday 9 April • (drop-in)
Free • Level 2



GEOSCIENCES: MEASURING OUR WORLD

How do we know that our environment is changing? Can you measure how far away something is without a tape measure? Or find the temperature of an object without touching it? Learn how geoscientists overcome these challenges to measure our world.

Saturday 5–Wednesday 9 April • (drop-in)
Free • Level 2



WHAT MAKES SUPERCOMPUTERS SUPER?

Supercomputers are vital in science, from microbiology to cosmology and even palaeontology. Find out what they are, discover what the UK's supercomputer does and make your own computer simulation of a dinosaur and watch it run!

Saturday 5–Wednesday 9 April • (drop-in)
Free • Level 2



MEET THE MEDICAL SCIENTISTS

Medical scientists investigate how the human body works to find new ways to treat illness and injury. Chat with our medical scientists to discover how they help keep us healthy, and get hands-on with cutting-edge science exploring the heart, brain and more.

Tuesday 15–Saturday 19 April • (drop-in)
Free • Level 2



SHOW



THE CHEMISTRY SHOW

ALL AGES

How can we make cars that don't harm the environment? What happens when things get really cold? And why should you cover your ears when **Paul Murray** and **Robin Andrews** light a match? Prepare yourself for bangs, colours, flames and foam in this vibrant jam packed show.

Monday 9–Thursday 12 April • 11am (50 mins) • Free (ticket required) • National Museum of Scotland Auditorium



Royal
Botanic Garden
Edinburgh

Saturday 5–Sunday 13 April
Garden open daily 10am–6pm

JOIN THE EXPEDITION!

Find hands-on workshops and fun for all the family at the Botanic with activities and exhibitions to suit all ages. The garden is open daily from 10am to 6pm and entry is free. There is an admission charge for the Glasshouses, but you can get in for free with the Expedition Botanics ticket.

EXPEDITION BOTANICS

AGES 4+

Join Expedition Botanics in the search for traditional knowledge about Colombian rainforest plants. Learn how to survive using the resources of the forest and help to discover how the people of the Amazon use plants in daily life. Collect stamps in your passport as you complete activities.

Monday 7–Sunday 13 April • 11am–5pm (90 mins) •
(drop-in) • £3 (under 3s free)



DROP-IN ACTIVITIES



SAVE OUR SEAS!

AGES 5+

Find out what the RSPB is doing to protect the UK's seas and coastal areas. You'll be surprised at the different species that use the sea around the UK – we get some exotic visitors. RSPB staff will be on hand to explain how they conduct their scientific research – some of it is dangerous work!

Saturday 5–Sunday 6 April • 11am–5pm
(drop-in) • Free • Atrium, John Hope Gateway



TREEZILLA: THE MONSTER MAP OF TREES

AGES 5+

Become part of the monster map of Britain's trees – Treezilla.org. Explore the trees mapped in Britain so far, learn how to map your own trees and measure the ecosystem services they provide. Get involved with tree-related arts and crafts, pick up some useful hints on tree identification and more!

treezilla.org
Saturday 5–Sunday 6 April • 11am–5pm
(drop-in) • Free • Real Life Science Studio,
John Hope Gateway

Presented by The Open University



SOIL CHEMISTRY CHALLENGE

AGES 5+

Do your own experiments to see what you could add to soil to help plants grow better, and learn about pH – with spectacular results. Join scientists from Scotland's leading land use and crop research institute, the James Hutton Institute, to investigate how we can improve soil to suit the crops we want to grow.

Monday 7 April • 11am–5pm (drop-in)
Free • Real Life Science Studio, John Hope
Gateway



FARMYARD ANIMALS: FRIENDS AND FOES

AGES 5+

A hands-on, family-friendly session with activities, storytelling and interactive displays about the lives of farm animals. Moredun scientists show how they help control pests and diseases. This leads to healthier and happier sheep, cows, pigs and chickens, and is better for the environment.

Tuesday 8–Wednesday 9 April
11am–5pm (drop-in) • Free • Real Life
Science Studio, John Hope Gateway



FOREST SURVIVAL

Learn how the forest can supply all your basic needs and choose what to take on your journey.



PLANT HUNTERS

Track down the new species of plant that your research has shown grows in this part of the Colombian rainforest.



FOOD OF THE GODS

Find the chocolate tree and discover how it provides a variety of food and drink.



AMAZONIAN ANIMALS

See if you can spot some rainforest animals.



GARDENS IN THE FOREST

Taste the yuca plant – an important crop in the forest gardens called 'chagra' in Colombia.



WISE PEOPLE

See the bixa plant, used for body painting, and have a design painted on your face to show your plant knowledge.



INCREDIBLE EDIBLES

Sow seeds to take home and find out how lessons from the forest gardens of Colombia can help you to grow your own food at home.

Expedition lunchboxes are available from the Terrace Café for £3.95 and will help keep your young explorers going all day! There will also be a range of Colombian-themed dishes to enjoy in the Gateway Restaurant.

ALSO AT THE ROYAL BOTANIC GARDEN EDINBURGH

Don't miss exhibitions and events for adults at the Botanics, see the Science Festival Events section for full details.

EXHIBITIONS SYLVA

A new exhibition featuring illustrated tree books and tree drawings by artist Sarah Simblet.

Saturday 5 April–Monday 26 May [p.30]

CORIN SWORN

For spring 2014 Inverleith House presents new work by the Glasgow-based artist Corin Sworn.

Saturday 12 April–Sunday 22 June [p.46]

TOUR LEAVES AND LITERATURE

An exclusive opportunity to see treasures from our Library and Archives, where the art and science of botany and horticulture meet.

Saturday 5 April [p.32]

FILM SCREENINGS AND DISCUSSIONS PROJECT WILD THING

Essential viewing for everyone who cares about our kids' future: funny, moving and potentially life changing.

Tuesday 15 April, 7pm [p.51]

LAPONIA: NATURE AND NATIVES

A film and discussion chaired by Tim Ingold on the relationship between the Sami reindeer-herders and the Swedish conservation authorities.

Thursday 17 April, 3pm [p.55]

EVENING EVENTS BOTANICS LATE: INDIGENOUS?

An evening in the John Hope Gateway celebrating the connection between culture and nature around the world featuring live music, hands-on activities, exhibitions and demonstrations.

Thursday 17 April, 7.30pm [p.54]

WORKSHOPS COLOMBIAN WISE PEOPLE AN INTRODUCTION

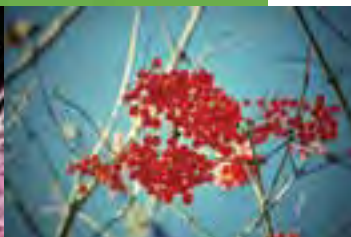
An introduction to the indigenous tribal experts who traditionally managed the Amazon Forest.

Saturday 5 April, 1pm [p.32]

COLOMBIAN WISE PEOPLE AND THEIR MEDICINE

An introduction to the plant medicine of the tribal people of the Colombian Amazon Rainforest.

Saturday 12 April, 1pm [p.46]



THE GREAT BIG BUG BUILDER

AGES 5+

Why do butterflies have long coiled mouthparts but beetles have strong sharp jaws? In this workshop you'll join scientists from Scotland's Rural College to find out all about different bug body bits and what they are for. Then design and build your own fantastical bug.

Thursday 10 April • 11am–5pm (drop-in)

Free • Real Life Science Studio, John Hope Gateway

THE SECRET POWERS OF PLANTS

AGES 5+

Plants are more mysterious than you might think. Many have hidden powers, or uses that you may not know anything about – until now! Scientists from Scotland's Rural College reveal how plants have some amazing abilities; strength and healing properties. Plants that we might think are useless can be very useful indeed.

Friday 11 April • 11am–5pm (drop-in)

Free • Real Life Science Studio, John Hope Gateway

BIG GARDEN BIRD WATCH: THE RESULTS

AGES 5+

Did you take part in this year's *Big Garden Bird Watch*? Would you like to know who the most common garden visitor is, and who might be losing out? RSPB staff will be on hand to explain the Bird Watch results and talk about their award-winning scientific research.

Saturday 12–Sunday 13 April • 11am–5pm

(drop-in) • Free Atrium, John Hope Gateway

PLANT DOCTOR

AGES 5+

Just like people, plants get sick too and without plants we would not be able to survive. Train to be a *Plant Doctor* with the British Society for Plant Pathology and find out how to identify plant diseases and how to help plants survive.

Saturday 12–Sunday 13 April • 11am–5pm

(drop-in) • Free • Real Life Science Studio, John Hope Gateway

THE YEARS JUST FLY BY, DON'T THEY?
JOIN US FOR OUR 25TH BIRTHDAY CELEBRATIONS

imagine
festival



5-12 MAY
2014

FOR SCHOOLS AND FOR FAMILIES - ALL AGES AND STAGES AT VENUES ACROSS EDINBURGH
SIGN UP TO OUR MAILING LIST FOR MORE INFORMATION OR TO REQUEST A FESTIVAL BROCHURE BY VISITING WWW.IMAGINATE.ORG.UK

The Festival is produced by  promote and develop performing arts for children and young people in Scotland

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supported through the
Scottish Government's
Edinburgh Festivals
Expo Fund

EDINBURGH INTERNATIONAL



INTERNATIONAL

Edinburgh International Science Festival is a world leader in its field with over 25 years' experience of creating high quality and engaging science events. Alongside our core festival, education and outreach activities in Scotland we also operate internationally and our work now reaches around half a million people every year.

Through our Ventures business, we work closely with national and international partners to help programme other Science Festivals, provide trained science communicators and tour our entertaining shows and workshops.

sciencefestival.co.uk/international



SUMMERHALL

Open daily Saturday 5–Sunday 20 April
10am–late

This spring Edinburgh International Science Festival is creating a brand new festival hub at Summerhall. During the day, the venue will come alive with a series of activities for children and families and in the evenings it will be filled with entertaining events for teenagers and adults.

Come along to experience sensational science shows and interactive workshops, try your hand at being a maker and tempt your tastebuds. There's something for visitors of all ages, interests and abilities with the chance to learn new skills, take on creative challenges or just have some science-themed family fun.

Listings of events for children and families are included on the following pages and full details of events for adults are in the Science Festival Events section of the programme – see pages 30–57.



NEW FESTIVAL HUB

HIGHLIGHTS

SENSATIONAL SCIENCE SHOWS

Our interactive shows offer a whole world of new experiences. Laugh as you learn how the body works with stories from some funny patients in *Body Builders*, experience the chill as we cool things down to sub-zero with the *Coldest Show on Earth* or take a journey to the Moon with Mr Boom.

MAKING THINGS

As part of *Making It*, we're holding a variety of interactive workshops at Summerhall which offer a range of in-depth maker experiences, from screen printing to soldering, making an earth clock, video game design or even creating your own animation! Why not take the chance to have a go at something new and build your maker skills?

Edinburgh Mini Maker Faire is also back after a hugely successful initial outing last year. Involving everything from traditional crafts to technological innovations, this year's event will also include a special space for mini makers.

FOODIE DELIGHTS

Check out *GastroFest* events at Summerhall and discover the science behind some of our favourite food and drinks. There's loads on the menu ranging from discussions and debates to interactive dining experiences. You can even bring the kids along and make your family food shopping fun at *SciMart* – an interactive farmers' market pairing local food producers with scientists and chefs.

VENUE SPONSOR

Baillie Gifford is delighted to support the Science Festival's new venue, Summerhall. Headquartered in Edinburgh, Baillie Gifford has a significant global presence, managing investments on behalf of pension funds, financial institutions, charities and retail investors. The firm is proud to play an active role in its community by supporting a diverse variety of projects across festivals and the arts, education and social inclusion.



INVESTMENT MANAGERS



SENSATIONAL SCIENCE SHOWS



SCIENCE LUCKY DIP

AGES 8+

A sensational science show where you decide what will happen!

James Piercy presents a random selection of his favourite science tricks for your amusement. Will you see the floating sausage, the burping pot or the funny forks? Take your pick then sit back and watch as the hilarity unfolds.

Monday 7 April · 1pm, 3pm
(30 mins) · £5, family ticket £16 (4 tickets)
Dissection Room

Presented by Science Made Simple



DAY OR NIGHT

AGES 5+

Benny and Jack are on a global adventure as they learn what children around the world are up to at exactly the same time. Why is one child getting up just as another goes to bed? Mindboggling questions about the Sun, Moon and Earth are answered in this colourful and interactive show.

Monday 7, Thursday 10, Saturday 12,
Monday 14 April, Thursday 17 April 11am
(1 hour) · £5, family ticket £16 (4 tickets)
Cairns Lecture Theatre



BODY BUILDERS

AGES 8+

Join Dr Watson and Nurse Treat It Better in our special teaching hospital as they meet a range of comedy patients who illustrate common ailments. This fast moving and hilarious show demonstrates how your body is put together and why it's so important to keep it in shape.

Monday 7, Thursday 10, Saturday 12,
Monday 14, Thursday 17 April · 2pm (1 hour)
£5, family ticket £16 (4 tickets) · Cairns
Lecture Theatre



COLDEST SHOW ON EARTH

AGES 5+

Luke Warm loves the cold. He wants everything and everyone on the planet to go sub-zero and is exploring ways to carry out his evil plan. Watch what happens when he subjects things to extreme temperatures – it's a chilling mix of shattered flowers, frozen fried eggs and exploding buckets! Can anyone stop him?

Tuesday 8, Wednesday 9, Tuesday 15,
Wednesday 16 April · 1pm, 3pm (35 mins)
£5, family ticket £16 (4 tickets) · Dissection
Room



THE SCIENCE CIRCUS SHOW

AGES 8+

Roll up, roll up – explore the thrills and spills of the Science Circus. Find out why jugglers love gravity, how clowns are really Jedis in training and why unicyclists keep moving to stay still. It's science but not as you know it!

Friday 11 April · 2pm, 4pm (45 mins) £5,
family ticket £16 (4 tickets) · Cairns Lecture
Theatre

Presented by Inspirational Science Theatre
Company

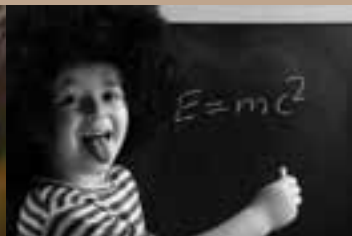


ZOO BUS

ALL AGES

Climb aboard the Zoo Bus and get up close to its collection of fascinating animals. Join **Mike Leahy** (who once grew a 3m tapeworm in his gut!) to discover how often-berated animals such as snakes and spiders can be beautiful; before entering the 'mini-micro' lab to investigate the parasites and pathogens that are truly dangerous.

Friday 11–Sunday 13 April · 11am–4pm
(drop-in) · Free



ALBERT EINSTEIN: RELATIVELY SPEAKING — JUNIOR EDITION

AGES 6+

Join Albert, the genius behind the übercoolest moustache in science, for a lecture like none you've ever attended. The eccentric theoretical physicist is accompanied by his two wives, mum on the piano, and guest rapper MC Squared, as he quantum leaps us through two world wars, two theories of relativity, and the deployment of two very big bombs. Warning: features the wurst sausage joke ever.

Sunday 13 April · 2pm (1 hour) · £8/£6
Cairns Lecture Theatre

Presented by Tangram Theatre Company



THE FLASH BANG SHOW

AGES 6+

This extravaganza of sound and vision is a fascinating introduction to the world of atoms, molecules, solids, liquids and gases. Join us for an explosive showcase of exciting demonstrations featuring sudden colour changes, fireworks and flashes, crashes and bangs.

Monday 14 April · 11am, 2pm (1 hour)
£5, family ticket £16 (4 tickets) · Dissection
Room

Presented by The University of Manchester



SING AND DANCE WITH MR BOOM

AGES 3+

Mr Boom – the children's one-man band – arrives from the Moon in the spaceship Imagination. Join him in this highly animated show featuring an exciting mix of song, dance and audience participation as you travel on an amazing adventure through time and space.

Tuesday 8, Wednesday 9, Tuesday 15, Wednesday 16 April · 11am (1 hour) · £5, family ticket £16 (4 tickets) · Cairns Lecture Theatre



PLANET OF THE PRIMES

AGES 8+

Maths is boring – ARE YOU KIDDING?! **Simon Pampena** is the Maths Man. He's a curious kid turned mathematical superhero. Join him on an intergalactic audio-visual adventure as he conquers the *Planet of the Primes*.

Tuesday 8 April · 2pm (1 hour)
£5, family ticket £16 (4 tickets) · Cairns Lecture Theatre



SCIENCE OF VAMPIRES

AGES 12+

Ever wondered if there is more to Dracula than a pale complexion and difficulties shaving? Join vampirologist **Kathryn Harkup** for a spooky tour through the history of vampires with frightening folklore, blood sucking bats and sinister scientific stories.

Wednesday 9 April · 2pm (1 hour)
£5, family ticket £16 (4 tickets) · Cairns Lecture Theatre



HUNGRY

AGES 12+

In this humorous contemporary drama, the lives of two very different women become inextricably intertwined when young, ambitious lawyer Suzanne employs Ruby, a grandmother, as her cleaner. *Hungry*, by acclaimed playwright Sarah Daniels, is a play that explores food and our relationship with it from Edinburgh Festival Fringe First winners Y Touring.

Thursday 10, Friday 11, Saturday 12 April
1pm, 3pm (1 hour) · £5, family ticket £16 (4 tickets) · Dissection Room

Presented by Y Touring



PERIODIC SUCCESS

AGES 7+

Take a journey from the Iron Age to the edges of our Solar System. The elements are brought to life before your eyes through explosions, laughs and a few grizzly tales as we unearth their secret lives. Join chemical physicist **Jamie Gallagher** for a guided tour of this iconic classroom poster with tales of murder, greed, romance and exploration.

Tuesday 15 April · 2pm, 4pm (1 hour)
£5, family ticket £16 (4 tickets) · Cairns Lecture Theatre

Presented by The University of Glasgow



CRACKING THE CODE: THE GENETICS OF SUPERHEROES

AGES 12+

Comic books are filled with mutants; heroes and villains whose special abilities are genetic in their origin. **Simon Watt** (*Inside Nature's Giants*) tackles the big questions: what are real mutants like, and could we use genetics to make us superhuman?

Wednesday 16, Thursday 17 April · 4pm (1 hour) · £5, family ticket £16 (4 tickets)
Cairns Lecture Theatre

Presented by Ready, Steady, Science



WALKING LIKE DINOSAURS

AGES 8+

Ever wondered how Triceratops trotted or Spinosaurus sprinted? If you're an aspiring palaeontologist, or just curious about the locomotion of long extinct beasts, join **Dr Phil Manning** (BBC One's *Walking With Dinosaurs*) one of the UK's leading dinosaur detectives to unpick how dinosaurs made their moves!

Thursday 17, Friday 18 April · 3pm (45 mins) · £5, family ticket £16 (4 tickets)
Dissection Room

Presented by The University of Manchester and The Science and Technology Facilities Council



ELEPHANT TOOTHPASTE SHOW IN BRITISH SIGN LANGUAGE

ALL AGES

Dr Audrey Cameron and **Gary Quinn** are Brainy and Brawny as they demonstrate science experiments in British Sign Language. Join them to discover exploding pop rockets, how to make elephants' toothpaste and other magic in a special interpreted event accessible to everyone.

Friday 18 April · 11am, 2pm (1 hour)
£5, family ticket £16 (4 tickets) · Cairns Lecture Theatre

Presented by Science Shows in BSL

WORKSHOPS



GETTING STARTED WITH ARDUINO

AGES 14+

Arduino is an easy to use microcontroller platform designed for learning. This all day, no experience required, introductory session for teenagers and adults will show you how to create your own electronically controlled projects from simple blinking lights to robots and music generators. All you need to bring is your laptop as all other materials are provided, including your very own Arduino and kit to take home.

**Saturday 5, Tuesday 8 April · 10.30am
(6.5 hours) · £60 · Hacklab**

Presented by Edinburgh Hacklab



INTRODUCTION TO SCRATCH

AGES 8+

The Scratch platform offers a fantastic, fun and easy to learn first step into computer programming. This beginner's session is for anyone who fancies programming a computer, introducing the basics of Scratch and helping you to edit ready-made projects and build your very own game.

**Monday 7–Friday 11 April · 10.30am
(90 mins) · £10 · Histology Lab**

Presented by Edinburgh Napier University



MADLAB

AGES 7+

MadLab is an interactive electronics workshop with specially designed circuit board kits available for all ages and abilities. Learn the secrets of soldering then use your skills to assemble your very own gadget. Join a team with friends and bring your own old toys or gadgets to create a unique machine in *MadLab Plus*.

**MadLab Monday 7–Friday 18 April
10.30am–5pm (45–75 mins) (drop-in)
Kits cost from £6**

**MadLab Plus Saturday 12–Sunday 13 April
10.30am and 1.30pm (up to 3.5 hours)
£35 per family · pre-booking essential
Histology Lab**

Supported by



IndigoVision



INTRODUCTION TO ARDUINO

AGES 10+

Arduino is easy to use and based on flexible hardware and software, making it a fun introduction to computer programming. This session will show you how Arduinos use sensors to detect and respond to changes in their environment, allowing you to create your very own programmes using sound, movement and flashing lights.

**Monday 7–Friday 11 April · 1pm
(90 mins) · £10 · Histology Lab**

Presented by Edinburgh Napier University



RESIN CASTING WITH MAKLAB

AGES 10+

Discover a technique that will transform your making as you learn how to copy components and reproduce them in plastic. We'll show you how to create a silicone mould and use it to cast resin copies. All materials provided.

**Friday 11–Saturday 12 April · 10.30am,
1pm, 3.30pm (2 hours) · £15**

Histology Lab



TAKING ARDUINO TO THE NEXT LEVEL

AGES 14+

If you're an experienced Arduino user, bring your project and laptop and let Edinburgh Hacklab help you take your programming to the next level. This all day session covers a wealth of advanced Arduino topics: how to update a display without missing any button presses, how to make your project talk to advanced sensors and devices and discover ways to make your project permanent and avoid a rats' nest of wires.

**Saturday 12, Tuesday 15 April · 10.30am
(6.5 hours) · £50 · Hacklab**

Presented by Edinburgh Hacklab



RED KITE ANIMATION

AGES 8+

A unique opportunity to make your very own animation, inventing new ways for the human body to do extraordinary things. Whether it's a robotic arm or a drink that gives you super human speed, animators from Red Kite will help you bring your ideas to life in a short animation to be hosted online.

**Sunday 13 April 10.30am, 1.30pm
Monday 14 April 12.30pm, 3.30pm, 6.30pm
Tuesday 15 April 12.30pm, 3.30pm
(2 hours) · £10 · Main Hall**



SCREENPRINTING WITH MAKLAB

AGES 10+

Discover the tools and techniques that will allow you to create amazing screenprints in no time. You'll build your own upcycled screen and stencils, before learning how to print some simple yet beautiful images to take home. All materials provided.

**Sunday 13–Monday 14 April · 10.30am,
2.30pm (3 hours) · £15 · Histology Lab**



SCRATCH FOR ARDUINO

AGES 10+

This session combines two easy to use computer programming platforms in a hands-on workshop. You'll explore the fundamentals of computer programming and develop your own basic interactive application that uses sensors to control a simple game or sound synthesiser.

Monday 7–Friday 11 April • 3pm
(90 mins) • £10 • Histology Lab

Presented by Edinburgh Napier University



SOLDER ON!

AGES 14+

Soldering is easy and we'll show you how. Starting with the absolute basics, you'll be shown the tools you need and how to make a solder joint, then you'll be able to get stuck in! Including your very own kit to solder and take home, this is your chance to learn a vital hacking skill.

Monday 7, Monday 14 April • 6.30pm
(2.5 hours) • £15 • Hacklab

Presented by Edinburgh Hacklab



SCOTLAND'S TIME LORDS

AGES 8+

200 years ago, Scottish geologist James Hutton suggested the Earth was very, very old. 4,600 million years old in fact! But how big a calculator would you need for all those numbers? Help us find out as we build an earth clock, marking events from dinosaurs' extinction, to human evolution, right up to the present day.

Tuesday 8–Friday 18 April • 10.30am, 11.45am, 2.15pm 3.30pm (45 mins)

Free • Main Hall

Presented by Our Dynamic Earth



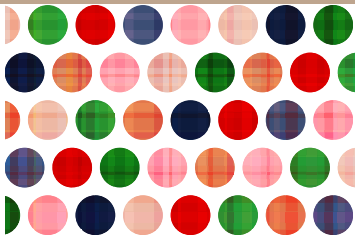
EXTREME SOLDERING: SURFACE MOUNT COMPONENTS

AGES 14+

Some hackers say surface mount soldering is hard because of the tiny components, but we'll show you it's really not that scary. Including your very own kit to build and take home, this session will show you the tricks and techniques to help you solder on.

Wednesday 9, Wednesday 16 April
6.30pm • £20 • Hacklab

Presented by Edinburgh Hacklab



CODE-A-KILT

AGES 8+

A unique introduction to programming as you create your very own tartan using simple code. Print your design and take it home to show off your newfound programming knowledge to your family and friends. Great fun and no previous experience required.

Monday 14, Thursday 17 April
10.30am, 11.45am, 1pm, 2.15pm, 3.30pm
(45 mins) • £5 • Main Hall

Presented by Chris Martin



NUMERACY FX

AGES 9+

If you've ever wondered how magic works, this is your chance to learn. This inspiring session brings numbers and magical processes to life and gives you the chance to create your very own clever tricks to take home and try on your friends and family.

Monday 14–Tuesday 15 April • 11am, 1pm, 3pm (1 hour) • £5 • Anatomy Lecture Theatre

Presented by Flummix



DESIGN A VIDEO GAME

AGES 8+

Design, programme and present your very own video game using just an Xbox 360 controller. This session will show you how to add objects, multiple characters and scoring elements and create pathways to build a fun and challenging game to share with your family and friends.

Tuesday 15 April • 10.30am, 2pm (2 hours)
£15

Wednesday 16 April • 10.30am (6 hours)
£30 • Histology Lab

Presented by ComputerXplorers SEScotland



COMPUTER SCIENCE FX

AGES 12+

The principles of computer science can help you become a master of mindreading and thought control. This session will help you understand the science of superpowers through computational thinking, helping you learn new skills in mathematics.

Wednesday 16–Friday 18 April • 11am, 1pm, 3pm (1 hour) • £5 • Main Hall

Presented by Flummix

WORKSHOPS



BUILD A GAMES CONTROLLER WITH MAKEKEY MAKEKEY

AGES 8+

MaKey MaKey is a clever invention kit that lets you transform everyday objects into computer touchpads. This fun interactive session will show you how to build games controllers with everything from Play-Doh to pencils and grapes to grown-ups.

Thursday 17 April • 10.30am, 2pm (2 hours) £15

Friday 18 April • 10.30am (6 hours) • £30

Histology Lab

Presented by ComputerXplorers SEScotland

EXHIBITION



SEEING THE UNIVERSE IN ALL ITS LIGHT

ALL AGES

This interactive exhibition showcases the story of astronomy, scanning from the past to the future and highlighting some of the key inspirational moments and technical challenges along the way. View some incredible images from the control desk, step up to our wall of facts and try out our micro robots.

Tuesday 8 April–Saturday 12 April

10am–5.30pm (drop-in) • Main Hall

Presented by The Science and Technology Facilities Council

Around Edinburgh

There's something for everyone, young and old, at Edinburgh International Science Festival this Easter. With a vast and varied selection of events in and around the city, you're sure to find the perfect solution for a great scientific day out.



SCIENCE FAIRS



SCIMART

ALL AGES

A day long farmers' market with a scientific twist – bring the kids along and make your family food shopping fun at *SciMart* as we pair food producers with researchers and chefs to reveal the fascinating science behind some of our favourite food and drink.

Sunday 6 April • 11am–4pm • £5 (under 12s free)

In association with The James Hutton Institute

Supported by



EDINBURGH MINI MAKER FAIRE

ALL AGES

Edinburgh Mini Maker Faire returns in 2014, once again offering a chance for making enthusiasts of all ages and disciplines – from crafters to geeks and artists to engineers – to share their skills and show off their work. You'll find everything from traditional crafts to technological innovation explored through workshops, demonstrations, talks and interactive presentations.

Sunday 20 April • 10am–5pm • £3 (under 3s free)

Edinburgh Mini Maker Faire is independently organised and operated under license from Maker Media, Inc.



BRICK WONDERS LEGO EXHIBITION

ALL AGES

The Wonders of the World recreated using just LEGO. These bricks are more than just a toy to Warren Elsmore who uses them to create fabulously detailed models, almost indistinguishable from the real thing.

Saturday 5–Sunday 20 April

10am–4pm (drop-in) • Adults £4,

Concessions £3, Children £2, Family ticket rate available • Riddle's Court

Presented by Scottish Historic Buildings Trust



STREET SCIENCE

ALL AGES

With mind-boggling experiments and dazzling science demos, our busking bikes take street performance to a whole new level. Find out all about the latest developments in Scottish science and witness explosions, weirdness and plenty of mess. Look out for our Street Science team around town and on your local high street up to and during the Science Festival and follow us on Twitter @EdSciFest for real time Street Science updates.

Saturday 22 March—Sunday 20 April

Free • Check website for details

Supported by



Building Stronger Town Centres
and supporting economic
development throughout Edinburgh



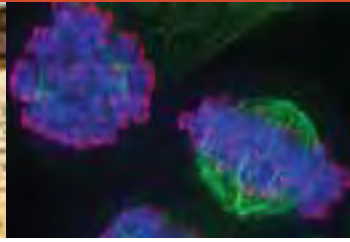
POWER OF TEN: INVENTING LOGARITHMS

ALL AGES

Four hundred years ago, Scottish mathematician John Napier's pioneering work on logarithms enabled more calculations to be completed in just one hour than had previously been achieved in a day. From the introduction of the decimal point to the development of slide rules, this exhibition explores how Napier's revolutionary innovations advanced and influenced mathematics from the 17th century to the present.

Friday 28 March—Sunday 6 July • Free (drop-in) National Museum of Scotland, Grand Gallery

Presented by the National Museum of Scotland



THE ART OF SCIENCE

ALL AGES

From cutting-edge medical research to the discovery of the Higgs Boson, this exhibition of striking images and objects celebrates the diverse and surprising range of scientific research going on right now at The University of Edinburgh. Be inspired and ponder the science at the heart of so many aspects of our lives.

Saturday 5 April—Saturday 19 April (not Sundays) • 9.30am—5.30pm • Free • University of Edinburgh, Visitors Centre

Presented by The University of Edinburgh



SCOTLAND'S TIME LORDS IN THE HEART OF EDINBURGH

ALL AGES

Join a time travelling tour in Holyrood Park. Step up to see if you can spot the evidence for ancient seas, exploding volcanoes and creeping glaciers as the fascinating geological history of the area is unraveled through an engaging mix of storytelling, activities and observation skills.

Please note: Tour involves steep climbs and rough paths.

Saturday 5, Monday 7, Wednesday 9, Friday 11, Sunday 13, Tuesday 15, Thursday 17, Saturday 19 April

10:30am and 2pm (2 hours)

Free with entry • Our Dynamic Earth

Presented by Our Dynamic Earth



THE FUTURE'S BRIGHT

ALL AGES

Join us to make a simple wind turbine and test it in the wind tunnel to see how fast it turns. Jump on the bike to see how much energy it takes to walk, cycle or drive to school and try out a range of fun activities that show how easy it is to have a cleaner, greener lifestyle.

Saturday 5—Sunday 20 April

11am—5pm (Allow around 30 mins to complete all the activities)

Free • The Centre Livingston

Supported by



NEW LIFE ON THE FARM

ALL AGES

Tour Gorgie City Farm and get up close and hands-on with our feathered and furry friends. Explore the importance of livestock for food production and experience some popular highlights including seeing a chick as it develops inside an egg and have your wellies nibbled by our piglets!

Saturday 5—Sunday 20 April

2pm (1 hour) • £4 (under 3s free)

Gorgie City Farm

Presented by Gorgie City Farm



PROFESSOR EGGHEAD AND THE SURVIVAL OF THE FITTEST

AGES 4+

Join Professor Egghead for a brand new interactive science show! Follow in the footsteps of renowned conservationist, John Muir, and embark on an adventure with some very special wildlife friends.

Saturday 5—Monday 21 April • 2pm (45 mins)

• Free with admission to Discovery Centre •

Scottish Seabird Centre

Presented by The Scottish Seabird Centre



WHAT A DRAG!

AGES 3+

Drag, also known as air resistance, is the force that air exerts on aircraft which slows them down. Follow a trail around our collections to see how this has shaped aeroplanes before learning more through science demonstrations with our facilitators. Then build your own model parachutist.

Saturday 5—Monday 21 April

12pm (drop-in) • Free • National Museum of Flight

Presented by National Museums Scotland

AROUND EDINBURGH



LIVING LINKS TO HUMAN EVOLUTION

ALL AGES

Observe university researchers as they study our closest living relatives. Take part in a host of related activities, from computer games to trying your hand at a problem set for primates.

Monday 7–Friday 18 April • 9am–6pm (drop-in)

Friday 11 April • 11am–1pm - the researchers will be on hand to chat about their research
Free with admission • Edinburgh Zoo, Living Links Exhibit

Presented by Edinburgh Zoo



THE SCIENCE OF LEGO

ALL AGES

The LEGO group produce about 19 billion elements per year, but what makes a simple plastic construction so popular? How strong are LEGO bricks and how does plastic choice affect stability and colour? Edinburgh artist in LEGO bricks, **Warren Elmore**, explores all this and more in a fun and informative lecture.

Wednesday 9–Thursday 10, Wednesday 16–Thursday 17 April • 6.30pm (1 hour)
Adults £10, Concessions £7.50, Children £5, family ticket available • Riddle's Court

Presented by Scottish Historic Buildings Trust



BEHIND THE SCENES AT THE CENTRE FOR RESEARCH COLLECTIONS

AGES 10+

Get behind the scenes at the Centre for Research Collections for a chance to see the unique scientific collections up close and personal. Join a tour to explore the cataloguing and conservation of the collections or come along to a talk to hear from the experts on how they currently use materials and implications for the future of their research. Find further details of talks on sciencefestival.co.uk.
Tour: Friday 11 and Saturday 12 April • 11am (1 hour) • Talks: Friday 11 April • 11.15am and 13.30pm (1 hour) • Free (ticket required)
University of Edinburgh, Centre for Research Collections

Presented by The University of Edinburgh



DR BUNHEAD'S EASTER BOGEY BUNNY

AGES 7+

Bouncing bogeys! It's the Easter bogey bunny. TV's **Dr Bunhead** (*Brainiac*, *Blue Peter*) explores the science of Easter things: chocolate eggs, bunnies and some added bogeys. Featuring exploding eggs, chocolate flame throwers, stunt bunnies fired into space and loads more dangerous science. *'Silly, crazy, dirty, dangerous and magnificent.'* The Daily Telegraph
Friday 11–Sunday 13 April
2pm (1 hour) • £5.50 child / £4.50 adult
George Square Theatre

Presented by The University of Edinburgh



THE ARTIST'S BOOK

AGES 12+

This artist's book workshop, led by **Susie Wilson**, will allow you to draw inspiration from some of The Royal College of Surgeons' most beautifully illustrated medical texts, and to experiment with book binding techniques in order to make your own artist's book.

12 April • 9.45am (7 hours) • £15
Surgeon's Hall Museum

Presented by Surgeon's Hall Museum



WILD MEDICINE

ALL AGES

Experience Wild Medicine at the Central Library, an exhibit exploring the different natural materials and behaviours that animals use to treat and prevent infections and disease. Then follow this up with a trip to the Zoo to see the behaviours in action.

Saturday 12 April–Tuesday 15 April • Central Library • Free

Wednesday 16 April • Edinburgh Zoo
Free with admission to Edinburgh Zoo

Presented by Edinburgh Zoo



ANATOMY DRAWING

AGES 8+

The study of topographic anatomy and anatomy in dissection is seen as a core activity for artists. This unique course, led by **George Donald**, will allow you to study the mechanics of the body with a life model, and to view the anatomical structures in dissection through the Museum Pathology Collections.

13 April • 10am (6 hours) • £15
Surgeon's Hall, Museum

Presented by Surgeon's Hall Museum



THE MEDIEVAL CONSTRUCTION SCIENCE SHOW

AGES 4+

Peter the stonemason has returned from the 14th Century to show us how medieval builders created amazing structures such as castles and abbeys. Follow the journey that a block of stone would have taken from the quarry to become the keystone in a beautiful gothic arch in this lively, interactive show.

Saturday 19, Sunday 20, Monday 21 April • 11.15am, 12.15pm, 2pm & 3pm (drop-in, 30 mins) • Free with admission • Edinburgh Castle

Presented by Edinburgh Castle



Living Lights

ALL AGES

The deep sea is 'a magical place filled with breathtaking light shows and bizarre and wondrous creatures – alien life forms that you don't have to travel to another planet to see.'

Dr Edith Widder, CEO & Senior Scientist, Ocean Research and Conservation Association

Living Lights photographic exhibition reveals how emission of light by living organisms is used for a variety of reasons, including fireflies who use periodic flashing to attract mates; dinoflagellates that make the sea sparkle at night; anglerfish whose bioluminescent lures attract prey and squid that expel luminescent clouds to repel predators.

The exhibition will introduce fluorescence and phosphorescence in species such as corals, and also illustrate how scientists' research on bioluminescence and fluorescence is being put to good use in cancer research, tracking disease progression, detecting infection, searching for new life, tracking movements, improving aeronautical designs and developing innovative lighting technologies.

Learn about these fascinating developments and more as we take you on a journey through some of the greatest light shows on Earth.

Monday 31 March–Sunday 20 April • Free • The Mound Precinct
Living Lights exhibition will be on display at Our Dynamic Earth
Thursday 24 April–Friday 31 October.

Curated by Nicola Coutts

With images from:

Dr Edith Widder (ORCA), Sönke Johnsen, Solvin Zankl, Jurgen Freund, Ethan Daniels, National Geographic Creative, Nature Picture Library, Osamu Shimomura (Marine Biological Laboratory), Danté Fenolio, Bodil Bluhm, Natural Visions, Cambridge iGEM, Science Photo Library, Anthony W. S. Chan (Emory University School of Medicine), Livet, Sanes, Lichtman (Harvard University), H Kubota, RL Brinster, James Hayden (University of Pennsylvania), Paul Naylor, Steve Trewhealla, Alex Tyrrell, Edinburgh super-resolution imaging consortium (Heriot-Watt University), NASA

Image credit:

A scorpionfish, *Scorpaenopsis*, glows fluorescent ©Ethan Daniels/OceanStockImages.com

Firefly insect ©Jurgen Freund/jurgenfreund.com

Fluorescent coral ©Jurgen Freund/jurgenfreund.com

Arctic deep sea cucumber, *Kolga hyaline*, Canada Basin, Central Arctic Ocean

©Bodil Bluhm/University of Alaska Fairbanks
Deep sea shrimp, *Acantheephyra purpurea* ©Edith Widder, ORCA/teamorca.org

Supported by

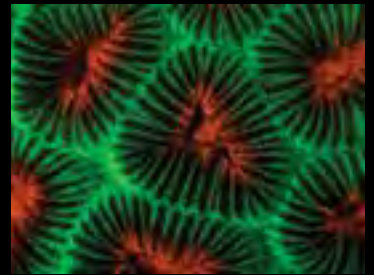
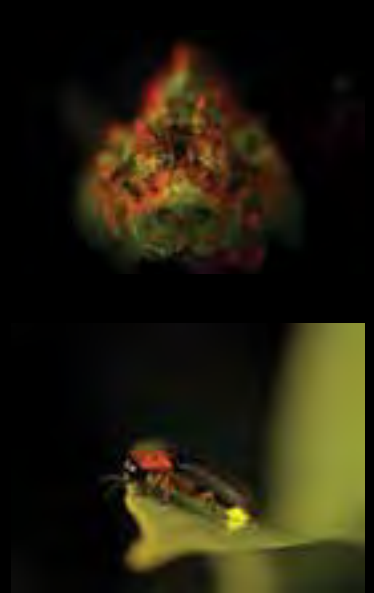


marinescotland



With thanks to:

City of Edinburgh Council
National Galleries of Scotland
Our Dynamic Earth





Science
at the heart of...
Everything



SCIENCE AT THE HEART OF EVERYTHING

Science is at the centre of every aspect of our daily lives and our 2014 programme of events for adults will take you on a journey from the inner workings of the human mind to the furthest depths of outer space.

We'll investigate the latest developments in healthcare and explore how science underpins our daily pursuits, pastimes and distractions. We'll face up to the science of some of today's most pressing global concerns and shed some light on the biggest and smallest of things: from the heart of the atom to the whole of the universe.

If you're curious about the world and our place in it, you'll find an amazing array of entertaining and enlightening events. Join us for a healthy lunch or a sensory dinner, a beginner's guide or an interactive experience and put science at the heart of everything.

JOIN THE CONVERSATION

Use the hashtag **#EdSciFest** to share your images, comments, questions and feedback with us online. You'll find us on Facebook, Twitter and Instagram.

SUMMERHALL

We'd love to see you at Summerhall, our brand new 2014 Festival Hub, where you'll find a huge variety of innovative and interactive events and exhibitions, a pop-up science bookstore from Blackwell's and plenty of scientists and artists to mingle with over a drink in The Royal Dick bar. With thanks to our new venue sponsor Baillie Gifford.

BARNEY'S BEER

Last year we brought you Culture#1—our special Science Festival anniversary beer from Barney's microbrewery. It went down so well that this year Barney's back (every year's an anniversary yes?!). Try our new brew at *Science Festival Lates* [p.30], *LateLab* [p.31] and from the Royal Dick bar at Summerhall—our social hub—and catch Barney himself at *Sensation* [p.33], *SciMart* [p.34] and *Edinburgh Mini Maker Faire* [p.57] and experiment with your tastebuds!



NATIONAL MUSEUM OF SCOTLAND

Throughout the Festival, the National Museum of Scotland offers a wealth of events and activities for all ages. As well as talks, workshops and presentations, the Museum's Grand Gallery will play host to *Making It... at the Museum* [p.12], our immersive showcase of maker culture, featuring demonstrations and interactive displays the whole family will enjoy.

EARLY BIRD TICKET OFFER

Buy 4 tickets for the Science Festival Events programme and receive your 5th ticket free! Cheapest ticket free, valid for five separate events only. Early Bird tickets must be booked by phone or in person by Saturday 29 March.

STUDENTS

This year, we're offering a special half price ticket offer for students—enjoy a lunchtime talk for just £2.50 or an evening out for as little as £4. Not valid on every event, see individual entries for price information. Advance booking is recommended as half price tickets are subject to availability.

AGE RESTRICTIONS

The Science Festival Events programme is designed for visitors aged 14+. This is a recommendation only and younger audiences are very welcome.

However, please note that a small number of events have an enforced age limit of 18+. These will be marked with AGE 18+ next to the listing. This restriction is in place due to event content and/or venue licensing laws. Identification will be required and under 18s will not be admitted under any circumstances.

SUMMERHALL VENUE SPONSOR



THROUGHOUT THE FESTIVAL



FIELD OF LIGHT

See Edinburgh's St Andrew Square differently thanks to *Field of Light*, an immersive experience by artist **Bruce Munro**. First seen at his home in Wiltshire in 2004, Munro reimagines his unique installation for every space it inhabits, using the medium of light to encourage visitors to explore pathways through the space in new, and beautiful, ways.

3 February–27 April • opening times may vary • Free (drop-in) • St Andrew Square

Presented by the City of Edinburgh Council



THE FALSE MEMORY ARCHIVE

Working with leading scientists from the relatively new field of false memory research, Artist **A R Hopwood's** work stimulates questions about how our minds construct the past. Drawing upon fascinating research demonstrating our susceptibility to false memories, this exhibition features contemporary artworks and a unique collection of vivid personal accounts of things that never really happened.

Saturday 15 March–Saturday 19 April (Tuesday–Saturday only) • 10am–5pm • Free (drop-in) • Talbot Rice Gallery

Presented by the Talbot Rice Gallery

Image: Erased UFOs, A.R. Hopwood.

Photograph: Steve Tanner



WILDLIFE PHOTOGRAPHER OF THE YEAR

Enjoy the beauty of our planet and the creatures that live on it captured by the lenses of professional and amateur wildlife photographers from around the world. These awe-inspiring images, selected from 43,000 competition entries from 96 countries, offer a glimpse of the natural world as it has never been seen before.

Friday 17 March–Sun 1 June • 10am–5pm • Free (drop-in) • National Museum of Scotland, Exhibition Gallery 2

Wildlife Photographer of the Year is co-owned by the Natural History Museum and BBC Worldwide. Image: © Hannes Lochner
Presented by the National Museum of Scotland



SYLVA

ALLAGES

Comprising of illustrations by artist **Sarah Simblet** as well as works from other classic tree books, this inspiring exhibition celebrates 350 years since the publication of John Evelyn's *Sylva – A Discourse on Forest Trees*. Come along to marvel at these remarkable drawings and vote for your favourite tree book of all time.

Saturday 5 April–Monday 26 May 10am–5.45pm • Free (drop-in) • Royal Botanic Garden Edinburgh, John Hope Gateway

Image: The Redwood Avenue at Benmore Botanic Garden - a drawing by Sarah Simblet for *The New Sylva*

Presented by Royal Botanic Garden Edinburgh

PART OF THE READING EXPERIMENT



SCIENCE FESTIVAL LATES: OPENING PARTY

AGES 18+

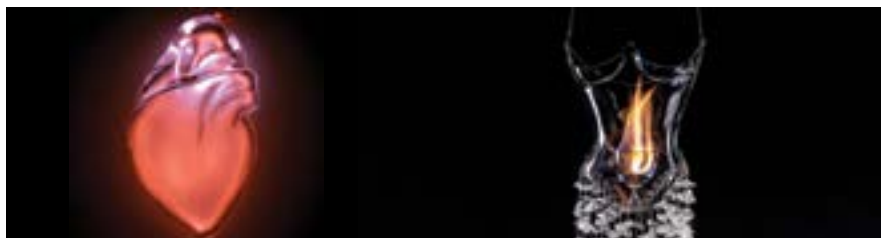
Fancy embarking on a Jungle Safari? Or having a go at keyhole surgery in A&E? *Science Festival Lates* is just the ticket as we turn our flagship children's venue over to adults only for one very special night. Celebrate the opening of the 2014 Festival with us as we explore science at the heart of things – we've got blood and guts, eyeballs and slime, bubbles and robots all mixed in with music, bars and fun. Don't miss the chance to get hands-on and get your geek on – grab a drink and join the party!

7.30pm (3 hours) • £10 • City Art Centre

Supported by



FRIDAY 4 APRIL



ART LAUNCH: SCIENCE AT THE HEART OF THINGS

We put 'Science at the HeART of Summerhall' with the launch of **Paul Robertson's** specially curated exhibitions showcasing the work of a selection of great artists with one main thing in common – they are all inspired by science in some shape or form. Plus, check out the Science Festival art trail and hear from some of the artists involved about their work, inspirations and collaborations.

7pm (2 hours) • Free (no ticket required)

Summerhall, Various

Image: Jessica Lloyd Jones 'Pulse' 2010

blown glass, neon electrics

In association with Heart Fine Art and

Summerhall

ANATOMY OF AN ARTIST: THE CHEMISTRY OF COLLABORATION

Often considered members of very different tribes, artists and scientists have more in common than many people think. All seek to explain the world around us, our place in it and the human condition, and the meeting of the two can create new knowledge, ideas and processes. And when top practitioners in each field collaborate? That is where the real magic lies...

Join **Prof Helen Storey** in conversation with Summerhall curator **Paul Robertson** and fellow artists at Summerhall during the Festival as we celebrate collaboration, co-operation and cross-fertilisation and the creativity and innovation these foster, and hear the fascinating stories behind their work.

7.30pm (90 mins) • Free (no ticket required) • Summerhall, Anatomy Lecture Theatre

Image: Berengo Studio *Dress of Glass and Flame* by Helen Storey, 2013

In association with the Helen Storey Foundation

Supported by





SCIENCE AT THE HEART OF THINGS

We put 'Science at the HeART of Summerhall' with a series of specially curated exhibitions and installations showcasing the work of artists inspired by science. Summerhall curator **Paul Robertson** brings together **Bigert & Bergström**, **David Burrows** of *Plastique Fantastique*, **Jessica Lloyd-Jones**, **Michel Paysant**, **Silas Parry**, a group exhibition entitled '*26/04/86*', featuring works by **Norrie Harman**, **Rebecca Appleby**, **Dean Kemp** and **Greg Townend** (who have created works inspired by their understanding of the Chernobyl disaster) and **The Bone Library**. The Science Festival's science-art trail complements these with works by **Prof Helen Storey**, **Will Nash**, **Sean Dooley**, **Richard Firth**, **Hugh Turvey**, **Helen Denerley**, **Fergus Dunnet**, **Biologica Mathematica**, **Tim Vincent Smith** and **Alan Brown**. Pick up a copy of our special Summerhall brochure and see our website for details, and explore the heart of science!

Full exhibitions open 5 April–24 May 2014 (11am–6pm) • Sci-art trail 5–20 April (11am–late) • Free (drop-in) • Summerhall, Various

In association with Heart Fine Art and Summerhall

SUNDAY 30 MARCH



SCIENCE FESTIVAL CHURCH SERVICE

The Lord Provost of Edinburgh and the Minister of St Giles' Cathedral invite you to the annual church service celebrating the opening of the Edinburgh International Science Festival.

11.30am (2 hours) • Free (no ticket required) St Giles' Cathedral

WEDNESDAY 2 APRIL



SPARKING IDEAS FROM SCIENCE

Explore the National Library of Scotland's science collections in this poetry workshop with Edinburgh-based writer, storyteller and science communicator **Emily Dodd**. You'll explore creative ways of expressing the science of everyday life through poetry, discovering facts, books and authors that will spark your imagination.

6pm (2 hours) • £10/£8 • National Library of Scotland

Presented by the National Library of Scotland

PART OF THE READING EXPERIMENT



LATELAB

LATELAB

Now in its third year, our popular *LateLab* series returns with an inspirational wunderkammer of talks, performances, interactives and installations. This year, regular favourites *Atmosphere* [p.32], *Electric Bookshop* [p.41], *Pecha Kucha* [p.53] and *Dialogues* all present special science-infused nights, while New York-based curator **Amanda McDonald Crowley** (Alt-w Design Informatics Curator-in-Residence) explores Art/Tech/Food in three very special *GastroLab* [p.35, 48, 57] events that bring together artists, researchers and gastronomists for dialogues on topics on everything from slow food to performance art.



And there's more... Entangle the senses with a fascinating exploration of synaesthesia in *The Taste of Blue* [p.46], delve into dystopia with a screening of Richard Fleischer's 1973 classic *Soylent Green* [p.32], or dice with the science of risk at *Casino Scienza* [p.56].

Real-time experiments run alongside expert encounters and the chance to sample creative catering whilst getting hands-on with unusual inventions and mingling with your fellow festival-goers. With no two events the same, *LateLab* is the ideal evening for the sci-curious.

LateLab is a collaboration between Edinburgh International Science Festival, New Media Scotland and The University of Edinburgh's School of Informatics.

See individual entries throughout the brochure and visit our website for full details of the *LateLab* programme.

Supported by

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GETTING STARTED WITH ARDUINO

Arduino is an easy to use microcontroller platform designed for learning. This all day, no experience required, introductory session for teenagers and adults will show you how to create your own electronically controlled projects from simple blinking lights to robots and music generators. All you need to bring is your laptop as all materials are provided, including your very own Arduino and kit to take home.

Workshop repeated Tuesday 8 April - 10.30am (6.5 hours) - £60 - Summerhall, Hacklab

Presented by Edinburgh Hacklab



LEAVES AND LITERATURE

The Library at the Royal Botanic Garden Edinburgh is Scotland's national reference collection for botanical and horticultural resources. This event offers a rare opportunity to see some of the treasures from the Library and Archive collections, which include more than 60,000 books, manuscript materials and original botanical illustrations.

11.30am (1 hour) - Free (ticket required)

Royal Botanic Garden, 20a Inverleith Row (offices entrance)

Presented by Royal Botanic Garden Edinburgh



COLOMBIAN WISE PEOPLE AN INTRODUCTION

Meet the Colombian wise people of the Amazon forest in a workshop introducing the area, terrain, location and culture of the ethnic groups who have sustainably managed the region for millennia. Covering their tradition of forest survival and sustainable management through hunting, fishing and use of plants you will gain an insight into the depth of the knowledge held within their culture. Then take a tour of the Botanic's glasshouses where you'll discover some of the key forest plants used by the indigenous people of this extraordinarily bio-diverse region.

1pm (3 hours) - £30 - Royal Botanic Garden, 20a Inverleith Row (offices entrance)

Presented by Royal Botanic Garden Edinburgh



MAD HATTER'S TEA PARTY

AGES 18+

Confound your senses with a trip down the rabbit hole to explore the science of human intoxication. Join ethnobotanist **Dr Ian Edwards** of the Royal Botanic Garden Edinburgh for a voyage of drug discovery from opium dens to the Olympics, taking in zombie caterpillars, afternoon tea, and the surprising patent medications of fashionable Victorians. Foraging ambassador **Miles Irving** will be serving up some unique soup with an array of experimental treats on offer for the curious visitor to this slightly deranged slice of wonderland.

4pm (2 hours) - £20 (includes tea, cake and some surprises!) - Summerhall, Main Hall

In association with Youth Heart Juice

PART OF MAKING IT... AT SUMMERHALL

PART OF THE READING EXPERIMENT

PART OF GASTROFEST



THE WINTON LECTURE: IS LIFE QUANTUM MECHANICAL?

Physicists and chemists are accustomed to dealing with the weird world of quantum mechanics, but it is only recently that biologists have been concerned with the subatomic world. Exciting discoveries in this new field of quantum biology are beginning to emerge. Join author and broadcaster **Prof Jim Al-Khalili**, currently writing a book on this topic with his University of Surrey colleague John Joe McFadden, as he explores how fragile quantum mechanical phenomena survive in the wet, warm biological world.

8pm (90 mins) - £8/£6, student offer £4 - National Museum of Scotland, Auditorium

Supported by



X-RAY VISIONARY

If seeing is believing then **Hugh Turvey**, permanent artist in residence at the British Institute of Radiology, helps us suspend our disbelief. Fascinated by what is hidden, Hugh's Xograms – his fusion of X-ray and photography – focus on the spaces in between, making the everyday appear uncommon and debunking the myth that beauty is only skin deep. With imagery from his recent London exhibition *EXPOSÉ, Material and Surface* and from the on-going University College Hospital arts-in health project – Hugh introduces us to a vision of transparency in a 'smoke and mirrors' world of spin and media manipulation.

8pm (1 hour) - £8/£6, student offer £4 - Summerhall, Anatomy Lecture Theatre

Image: Hugh Turvey, Artist in Residence at the British Institute of Radiology; *Stiletto (Femme-Fatale Artemis)* 1998.



LATELAB: ATMOSPHERE • SOYLENT GREEN

Make room, make room! *Atmosphere* is back, but wait a minute, it's now 2022. Earth is overpopulated, polluted and malnourished, but Soylent Industries has a solution... They can take plankton from the sea and make food, Soylent Green; far more appetising than their red or yellow varieties too. Starring Charlton Heston and Edward G Robinson, this 1973 science fiction classic was directed by Richard Fleischer. Guest augmentologists will respond with ideas about algaculture and synthetic biology. The tasty twist in the tail will undoubtedly have you gripping the furniture.

LateLab is a collaboration between Edinburgh International Science Festival, New Media Scotland and The University of Edinburgh's School of Informatics.

9.30pm for 10pm (2 hours) - Free (ticket required) - Informatics Forum

PART OF LATELAB

PART OF GASTROFEST



SEPARATING FAT FROM FICTION

Television, newspapers, glossy magazines; through the eyes of the media we have seen the obesity epidemic unfold, but what's really happening? From genetics to food choices, join this interactive debate exploring the complex interactions that determine our weight and our waistlines. BBC's Health Correspondent **Eleanor Bradford** is joined by **Prof Julian Mercer** of the Rowett Institute of Nutrition and Health at the University of Aberdeen; **Dr Tony Goldstone**, Consultant Endocrinologist and Senior Lecturer at Imperial College London; **Dr Naomi Brooks** and **Dr Colin Moran**, Lecturers in Health and Exercise Science at the University of Stirling.

5.30pm (90 mins) • £8/£6, student offer £4 • National Museum of Scotland, Auditorium

Presented by The Physiological Society and The Biochemical Society

THE PROUST EFFECT

The senses can be powerful memory triggers, eliciting both positive and negative emotions. The 'Proust Effect' occurs when a long forgotten smell or taste can connect us to our childhood, or a piece of music transports us back to our adolescence.

Author and senses expert **Dr Cretien Van Campen** of the Netherlands Institute for Social Research – whose work includes both social studies and artistic projects – will explain how sense memories work, why they are special, and hopes to elicit scent memories from the audience with a range of specially concocted aromas.

5.30pm (90 mins) • £8/£6, student offer £4 • Summerhall, Anatomy Lecture Theatre

Presented by Oxford University Press

SENSATION

AGES 18+

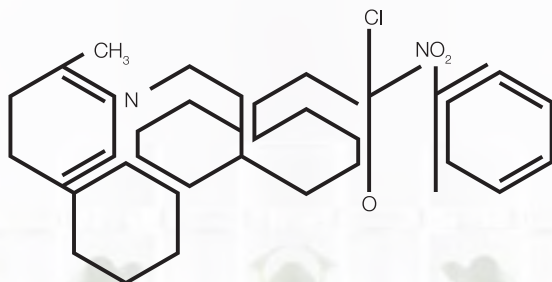
If you liked or missed last year's, *Sensory Dining*, you'll love *Sensation* – a theatrical dining experience that explores the science behind the flavours, textures, shapes and smells of our food. Working with scientists, food and drink producers, artists and thinkers, Edinburgh-based food pioneers **Jelly & Gin** create a feast like no other. Eat up and explore scrumptious installations that will both confuse and delight your senses. Choose which shape is sweeter, chew on the taste of words and sample the bitterest of beers in the company of Oxford University's **Prof Charles Spence**, University of Birmingham's **Dr Jennifer Norton**, beer writer **Pete Brown**, **Andrew Barnett** of Barney's microbrewery and top mixologists **Zoe Burgess** and **Max Venning** from London's 69 Colebrooke Row/Drinks Factory.

7pm (3 hours) • £45 (includes a 3-course meal and a glass of something special) • Summerhall, Dissection Room

PART OF GASTROFEST

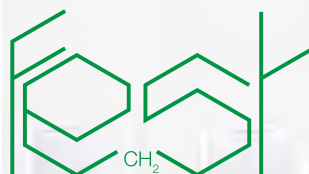
PART OF THE READING EXPERIMENT

PART OF GASTROFEST



A mini festival of the science of food and drink, *GastroFest* showcases the importance of science in our lives in the most delicious way possible; through a series of innovative events exploring the centrality of science to our culinary experience. A smorgasbord of insightful talks, out-of-this-world dining experiences and a special science-themed farmers' market, *GastroFest* has something to appeal to all appetites.

Bringing together producers, artisans, scientists and chefs, our events will lead you on an alimentary odyssey, taking in everything from the neuroscience and psychology of taste perception to slow food and cutting-edge molecular cocktails. Take a trip through the science of intoxication at the *Mad Hatter's Tea Party* [p.32], sample delicious foods with science secrets at our *Feast of the Commonwealth* [p.44] gala dinner, or join creative catering wonders **Jelly & Gin** for an evening of extraordinary dining in *Sensation* [p.33].



Supported by



SCOTLAND
OF FOOD & DRINK



wellcome trust



SCIMART

A farmers' market with a scientific twist, *SciMart* brings together food producers, researchers and chefs to reveal the fascinating science behind some of our favourite foodstuffs. With demos, talks and tasty treats, *SciMart* brings you a packed menu and food for thought in the form of cooking demos from top Edinburgh chef **Mark Greenaway**, talks by stand-up mathematician **Simon Pampena**, researchers from the James Hutton Institute and the Scotch Whisky Research Institute, brewers from Summerhall's in-house brewery Barney's and bug-eater **Craig Macfarlane**. See sciencefestival.co.uk for full details of talks programme.

11am–4pm (drop-in) • £5, under 12s free • Summerhall, various

In association with The James Hutton Institute

Supported by



THE ART OF COFFEE

Sweetly roasted or full-bodied and bitter? Find out how the chemical make-up of your coffee is key to its aroma and taste. Take a break and join **Prof Mike Lean**, Chair of Human Nutrition University of Glasgow alongside **Dr Tanita Casci**, **Dr Isabel Vincent** and **Dr Stefan Weidt** from the University of Glasgow Polyomics group and Glasgow Science Festival for live demonstrations, talks and tasty samples.

3pm (90 mins) • £8/£6, **student offer £4** (tickets include entry to *SciMart*) • Summerhall, Histology Lab

In association with



Supported by



PART OF GASTROFEST

PART OF GASTROFEST



MOLECULAR MASTERY

AGES 18+

Molecular mixology uses the scientific equipment and techniques of molecular gastronomy to create cocktails with greater intensities and variety of flavours, unexpected combinations of tastes and textures and new ways of presenting drinks. Join **Prof Andrea Sella** and top mixologists **Zoe Burgess** and **Max Venning** from London's 69 Colebrooke Row/Drinks Factory as they demonstrate how the art of cocktail making has become a science and show you tricks of the trade that will help you experiment at home.

8pm (90 mins) • £25 (includes cocktails) • Summerhall, Main Hall



STRANGE ATTRACTOR

The monthly multi-arts laboratory of music, sound and light, curated by Edinburgh-based acoustic improv trio **s:n:k** presents a Science Festival special, bringing together artists and musicians who explore scientific and technological processes as part of their work. Performances include circuit bending from technology artist **Alan Brown** of the 9-volt project and live international collaborative improvisation from the **Free Variety Theatre**.

8pm (2 hours) • £8/£6 • Summerhall, Anatomy Lecture Theatre

PART OF GASTROFEST





TRYING NOT TO TRY

Why is it hard to fall asleep the night before an important meeting? Or be relaxed on a first date? Find out why we find spontaneity so elusive, and how early Chinese thought points the way to a happier life, encouraging us to pursue our goals indirectly. Author and academic **Edward Slingerland** of the University of British Columbia blends Eastern thought and cutting-edge science to show us a fulfilling alternative to striving modern culture.

3pm (90 mins) - £8/£6, **student offer £4** - National Museum of Scotland, Auditorium

Presented by Canongate Books

LATELAB: GASTROLAB · RGB COCKTAIL PARTY

AGES 18+

The host of our RGB (Red, Green, Blue) cocktail party is French-American food designer and artist **Emilie Baltz**. Based in New York and Paris she works at the intersection of gastronomy, performance and the visual arts to stimulate the definition of taste by provoking the five senses in new ways.

In this 'Triptych for Enlightened Drinking' you will discover the effects of light and colour on solids (man) and liquids (cocktails) and how they impact human psychology. Real time visuals produced by DJ **Steve Gibson** will bathe the laboratory with colour to complement each of the three phases of mixology.

LateLab is a collaboration between Edinburgh International Science Festival, New Media Scotland and The University of Edinburgh's School of Informatics.

7pm for 7.30pm (3 hours) - £10/£8 - Informatics Forum

A PERFECT MATCH: MARRYING MALTS AND MOLECULES

AGES 18+

Why are some food and drink combinations delightful, while others are disastrous? Join **Ewan Henderson** of Scotch Broth Events, **Dr Tanita Casci**, **Dr Isabel Vincent** and **Dr Stefan Weidt** from the University of Glasgow Polyomics group and Glasgow Science Festival for an evening that demystifies the science of scotch. Enjoy pairing drams with dramatic foods to bring you a multi-sensory eating and drinking experience with plenty of opportunities to sample the flavour combinations that create that elusive perfect match.

8pm (90 mins) - £25 (includes canapés and whisky)

Summerhall, Dissection Room

In association with



Supported by



PART OF LATELAB

PART OF THE READING EXPERIMENT

PART OF GASTROFEST

PART OF GASTROFEST

SCOTLAND DECIDES

One of the most important decisions in our nation's history will be taken this September, when Scotland goes to the polls to determine its future. In a series of fascinating and eminently topical debates, *Scotland Decides* brings scientists, politicians, academics and the public together to discuss and envision the shapes this future could take. Healthcare, energy, research and innovation, funding and the psychology of choice all come under the microscope as we combine expert input with good old-fashioned debate.

The perfect platform for discussion about the science at the heart of the issues, opportunities, benefits and risks associated with an independent (or not!) Scotland, this thoughtful and engaging series promises to be one of the highlights of the Festival programme.

THURSDAY 10 APRIL

Choosing a Healthy Future [p.42] examines the theoretical blueprints for tackling Scotland's distinct healthcare provision needs.

SATURDAY 12 APRIL

Floating voters should head to *In Two Minds* [p.47] to learn about the mechanics of media influence and the surprising subconscious factors that drive decision making.

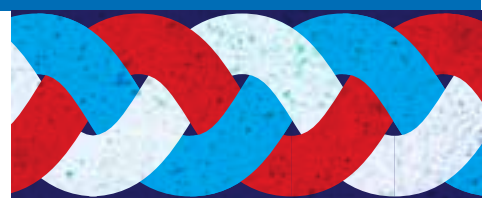
What would an independent Scotland mean to academia? Join our *Triple Helix Referendum Debate* [p.47] panel to discuss.

THURSDAY 17 APRIL

The Perfect Mix [p.55] tackles the key question of how we can make best use of our energy resources and technical know-how to keep the home fires burning.

FRIDAY 18 APRIL

Choose Your Scotland [p.56] allows the audience to take the referendum into their own hands by creating a map of the new nation based on a series of group-generated choices.





A VERY SHORT INTRODUCTION TO... SLEEP

Our new *Food for Thought* series lets you get your teeth into some essential science on your lunch break. In the first helping, **Russell Foster**, Professor of Circadian Neuroscience at the University of Oxford and President of the British Neuroscience Association, presents a bite-sized overview of the science of sleep. What is it? Why do we need it? How much is enough? And, with sleep disorders and deprivation becoming more prevalent in our stressful lives, what happens when we don't get enough?

1pm (1 hour) • £5, **student offer £2.50** • Summerhall, Red Lecture Theatre

Presented by Oxford University Press

SECRETS OF SCIENCE WRITING

Join writers **Barbara Melville** and **Pippa Goldschmidt** to discover the secrets of scientific writing in an interactive workshop which examines a range of writing techniques used by scientists to share knowledge and critique ideas. You'll start off by analysing narratives from scientific press and then learn how to employ precise observation to produce writing rich in detail for use in both fiction and non-fiction.

5pm (3 hours) • £10/£8 • National Library of Scotland

Presented by the National Library of Scotland

BRAINWAVES: SENSORY DINING

The BBC Radio Scotland series, *Brainwaves*, explores the science behind our everyday experiences, and nowhere is this centrality of science to our lives more evident – or delicious! – than in the area of food and drink.

Presenter **Pennie Latin** is joined by Oxford University's **Prof Charles Spence**, **Andrew Barnett** of Edinburgh microbrewery Barney's Beer and New York-based curator **Amanda McDonald Crowley** to explore the science behind the flavours, textures, shapes and smells of our food. Dinner will never be the same again.

5.30pm (90 mins) • Free (ticket required) • Summerhall, Dissection Room

Brainwaves will be recorded for broadcast on BBC Radio Scotland

In association with



PART OF FOOD FOR THOUGHT

PART OF THE READING EXPERIMENT

PART OF THE READING EXPERIMENT

PART OF GASTROFEST

MONDAY 7 APRIL



REMIX: DNA VS HIP HOP

In 1973, two things took what already existed, remixed it, and changed everything that followed: genetic engineering... and hip hop. These acts of unprecedented creation sparked cultural revolutions and here, in a shameless attempt to fuse two things he loves, author and broadcaster **Adam Rutherford** (BBC Radio 4, *Inside Science*) will use science and samples to draw out the striking similarities between their histories and explore the nature of creativity in science and culture.

8pm (90 mins) • £8/£6, **student offer £4** • Summerhall, Dissection Room

LET THEM EAT CAKE: CHALLENGING HEALTH MYTHS

Do you exercise for an hour each day? Drink eight glasses of water? Eat your five portions of fruit and vegetables? Detox once a month? Stock up on antioxidants and probiotics? Is there any scientific basis for the five-second rule that food picked up from the floor quickly has a lower risk of contamination? Join our myth-busting experts *New Scientist* journalist **Caroline Williams** and **Dr John Babraj** of Abertay University as they scrutinise the science behind some common (mis?)perceptions and help you separate health facts from health fiction.

8pm (90 mins) • £8/£6, **student offer £4** • Summerhall, Red Lecture Theatre

MERCURY: WINDOW ON THE INVISIBLE

Mercury is the most beautiful element in the periodic table. And the most reviled. The only liquid metal, its inertness and density have made it crucial to science and its exotic-sounding red ore, cinnabar, has appeared in artwork for at least 2,000 years. UCL chemist and broadcaster, **Prof Andrea Sella**, explores the mysterious world of mercury and explains why in his opinion we should feel a little sad as this most poisonous of elements becomes the first to face a worldwide ban.

8pm (90 mins) • £8/£6, **student offer £4** • Summerhall, Anatomy Lecture Theatre

PART OF MAKING IT... AT SUMMERHALL

PART OF GASTROFEST



POISONS AND PARACETAMOL

The ubiquitous painkiller paracetamol is the cause of around 50% of poisoning admissions to hospital and approximately 150 deaths each year. **Prof Nick Bateman and Dr James Dear** lead a panel discussion examining the dark side of this medicine cabinet staple, looking at clinical treatments and social interventions aiming to tackle paracetamol poisoning and speculating on the potential pain relievers of the future.

5.30pm (90 mins) - £8/£6, student offer £4
Summerhall, Red Lecture Theatre

Presented by the British Pharmacological Society

URBAN GARDEN (OF EDEN)

Since we first daubed the walls of caves, humans have decorated the world around them with images of animals and plants that express a plethora of ideas. From wild animals signifying everything from time, space or death to sending messages of glory or power, to contemporary cities full of plants, flowers or fruit as expressions of joy, abundance, mystery or even humour. Author, researcher and lecturer, **Dr Olga Zinovieva** of Lomonosov Moscow State University, shares her love of and expertise in urban development and symbolism and reveals how contemporary cities have their own ways of sculpting the biodiversity around us.

5.30pm (90 mins) - £8/£6, student offer £4
Summerhall, Cairns Lecture Theatre

In association with the All-Russia Science Festival

FROM DEEP SEA TO DEEP SPACE

This year's Festival photography exhibition showcases the brilliant world of fluorescence and bioluminescence, and in this complementary event, **Prof Rory Duncan and Dr Paul Dalgarno** of Heriot-Watt University take us on a hands-on journey through fluorescent microscopy. Light-emitting molecules from coral and jellyfish have had a huge impact on biological sciences, allowing us to visualise this complex environment in microscopic scale. Explore fluorescent microscopy's role in developments in diseases, drugs and our understanding of life itself in this presentation with interactive examples.

5.30pm (90 mins) - £8/£6, student offer £4
Summerhall, Anatomy Lecture Theatre

Presented by Heriot-Watt University

SOLDER ON!

Soldering is easy and we'll show you how. Starting with the absolute basics, you'll be shown the tools you need and how to make a solder joint, then you'll be able to get stuck in! Including your very own kit to solder and take home, this is your chance to learn a vital hacking skill.

Workshop repeated Monday 14 April
6.30pm (2.5 hours) - £15 - Summerhall, Hacklab

Presented by Edinburgh Hacklab

PART OF MAKING IT... AT SUMMERHALL

THE READING EXPERIMENT

'What an astonishing thing a book is. It's a flat object made from a tree with flexible parts on which are imprinted lots of funny dark squiggles. But one glance at it and you're inside the mind of another person, maybe somebody dead for thousands of years. Across the millennia, an author is speaking clearly and silently inside your head, directly to you. Writing is perhaps the greatest of human inventions, binding together people who never knew each other, citizens of distant epochs. Books break the shackles of time. A book is proof that humans are capable of working magic.'

Carl Sagan

Immerse yourself in the world of science writing in all its richly diverse forms with our exciting new initiative. Celebrating the spaces where the worlds of science and words collide, and acknowledging the power of each, *The Reading Experiment* will encourage you to engage anew with science writing of all sorts – from popular science to poetry, literacy fiction to sci-fi; the range is broader than you might think.

We'll be sharing inspirational reading lists and recommendations from some of your favourite scientists and science-enthused celebrities. What books are on their bedside tables and

bookshelves? Did any book really inspire them and if so why? Plus get your thinking caps on and start planning your entry in our first ever 'Sci-Ku' competition (launching in March); can you capture a science-inspired theory or idea in 3 short lines? Remember to choose your words carefully!

And throughout the Festival we are working with literary types from across the city to host author talks, workshops and other special events that explore the creative nexus between science and words.

Take part in *The Reading Experiment* and connect with science through the written and spoken word, accessing an endless treasure trove for those times of year when the Science Festival isn't here to quench your thirst for knowledge.

In partnership with Dunbar SciFest and Midlothian Science Festival.
 With thanks to Blackwell's Bookshop, National Library of Scotland, Royal Botanic Garden Edinburgh, Scottish Book Trust, Scottish Poetry Library, Scottish Storytelling Centre, UNESCO Edinburgh City of Literature

Supported by





SCIENCE AND THE FIGHT AGAINST HEART DISEASE

Directly or indirectly, most of us will be affected by heart disease at some time, and it is the main cause of death in Scotland. But what causes a heart attack and how is science helping to defeat this killer disease. In the first of our 2014 *Healthy Lunches* series – in which we explore important health-related topics in vibrant lunchtime events – **Dr Peter Henriksen** and **Dr Nick Mills**, cardiologists at Edinburgh Heart Centre explore how scientific endeavour and research has driven our understanding of the causes of coronary heart disease and led to the selection of safer and better treatment.

1pm (1 hour) • £5, student offer £2.50

National Museum of Scotland, Auditorium

Presented by the Royal College of Physicians of Edinburgh

PART OF HEALTHY LUNCHES



A VERY SHORT INTRODUCTION TO... ANXIETY

Are we born with fears or do we learn them? And why do they persist? What's happening in our brain when we feel anxious and what is its purpose? Popular psychology writer **Jason Freeman** and **Prof Daniel Freeman** from the University of Oxford present the second of our bite-sized introductions, showing why anxiety is a normal and vital part of our emotional life and explaining the factors that cause it. Get your teeth into some science on your lunch break!

1pm (1 hour) • £5, student offer £2.50

Summerhall, Red Lecture Theatre

Presented by Oxford University Press

PART OF THE READING EXPERIMENT

PART OF FOOD FOR THOUGHT



BRUNO PONTECORVO: PHYSICIST AND ATOMIC SPY?

Join acclaimed physicist **Prof Frank Close** of the University of Oxford to explore the life of Bruno Pontecorvo, a brilliant atomic physicist who defected from the West to the Soviet Union at the height of the Cold War. Learn about the mystery that surrounded his sudden disappearance, and his immense value for the Soviet Union as Frank opens up a world of intelligence and counter-intelligence involving blueprints of a nuclear reactor, the theft of the materials for an atomic bomb and reveals for the first time the tipoff that led to Pontecorvo's defection.

5.30pm (90 mins) • £8/£6, student offer £4

National Museum of Scotland, Auditorium



CREATION — THE ORIGINS OF LIFE

Life began soon after the Earth's tumultuous formation, and has evolved into an astounding array of complexity – the only living things in the known universe. But how did the first organism emerge from the geochemistry of the capricious young planet? What ingredients – from all around the Solar System – conspired to form a system capable of sustaining the spark of life continuously for four billion years?

Author, broadcaster and geneticist **Dr Adam Rutherford** quizzes **Dr Zita Martins**, Royal Society University Research Fellow at Imperial College, and Glasgow University's Regius Chair of Chemistry, **Prof Lee Cronin**, on the bleeding edge theories and experiments that are probing the biggest question of all: the origin of life.

5.30pm (90 mins) • £8/£6, student offer £4

Summerhall, Dissection Room



TRAINING THE MIND FOR HAPPINESS

Why does turning inwardly and settling our mind through meditation enable the development of human potential for wellbeing and happiness? And what have psychology and neuroscience got to say about the potential for meditation, including mindfulness, to change the brain?

Dr Dusana Dorjee, a cognitive neuroscientist, and **Sarah Silverton**, a mindfulness teacher, both from the Centre for Mindfulness Research and Practice at Bangor University, discuss four basic levels of mind/brain transformation through meditation – including systems of attention, emotion, motivation and consciousness and invite you to join short guided mindfulness practices, learning first-hand what mindfulness is.

8pm (90 mins) • £8/£6, student offer £4 • Summerhall, Dissection Room



THE SCART CONNECTION

Which is more significant, a Nobel Prize for scientific discovery or the Turner Prize for art? What is beauty in physics, and what is truth to a silversmith? Join researchers from The University of Edinburgh's School of Physics and Astronomy and Edinburgh College of Art as they present the findings from a unique collaboration. Presenting elements of their research that elaborate the notions of truth, rigour and originality in their respective disciplines, they may even reveal what they learned when they connected the dots between science and the arts. Hosted by **Prof Chris Breward**, Principal of Edinburgh College of Art.

8pm (90 mins) • £8/£6, student offer £4 • Summerhall, Red Lecture Theatre

Presented by Edinburgh College of Art and The University of Edinburgh's School of Physics and Astronomy



THE STRESSED SEX

Mental illness affects millions of people every day, and it seems to disproportionately affect women but clinical psychologist **Prof Daniel Freeman** of the University of Oxford and science writer **Jason Freeman** set out to investigate the truth of this when they researched and wrote *The Stressed Sex*.

Join them for an eye-opening analysis of the controversial issue of gender and mental health as they explore the current state of understanding of mental illness in men versus women, asking who is more likely to develop mental health problems?

8pm (90 mins) • £8/£6, student offer £4 • Summerhall, Cairns Lecture Theatre

Presented by Oxford University Press

PART OF THE READING EXPERIMENT



FORENSICS AND FICTION

Scottish Crime writing is some of the best in the world and readers love the gory and precise details of crime scene forensics. But how do writers get their facts straight? Join bestselling crime writer **Lin Anderson** as she discusses the process of writing her successful forensic thriller series with real-life forensic psychologist **Dr Kathy Charles** of Edinburgh Napier University. Some might call it a night of science, syntax and sin!

5.30pm (90 mins) • £8/£6, **student offer £4**

Summerhall, Cairns Lecture Theatre

In association with Bloody Scotland

SKEPTICS AT THE SCIENCE FESTIVAL

Returning for another year to Edinburgh's spooky Banshee Labyrinth, the Edinburgh Skeptics will delve into the world of strange and unexpected science with some very different speakers providing a skeptical insight into some surprising topics. A unique opportunity to enjoy an entertaining and relaxed evening of science, reason and critical thinking.

Tuesday 8–Thursday 10, Tuesday

15–Thursday 17 April • 7.30pm (1 hour)

Free, (ticket required) • Banshee Labyrinth

Presented by Edinburgh Skeptics

THE ARUP LECTURE 2014: SPONTANEOUS MOBILITY

What is the future for transport in our ever burgeoning cities? **Prof John Miles** of the University of Cambridge/Arup asks what might be required to deliver publicly-accessible transport services which are sufficiently attractive and effective to tempt people away from using their cars? It is postulated that an avalanche effect could be triggered if cities provide transport systems as spontaneous and convenient to use as private cars, yet as affordable as a bus. What might such a future look like and what will it take to make it happen?

8pm (90 mins) • £8/£6, **student offer £4**

National Museum of Scotland, Auditorium

Supported by

ARUP

HELIX: AN ILLUSTRATED HISTORY OF DNA

Join us for the launch of *Helix*, an online graphic novel created by artist **David Blandy**, scientist and writer **Adam Rutherford** and illustrator **Daniel Locke**. *Helix* tells the history of DNA from the perspective of a 500-year-old man kept alive by genetic therapy. Spanning a 40,000-year period – from ancient chimera, to modern day spider goats, to a speculated future of centuries old human beings – Daniel and Adam's illustrated presentation will guide you through *Helix*, straight to the heart of the matter.

8pm (90 mins) • £8/£6, **student offer £4**

Summerhall, Anatomy Lecture Theatre

Commissioned by Lighthouse and supported by the Wellcome Trust. Digital production by Storythings.

PART OF THE READING EXPERIMENT



EDINBURGH MEDAL

The 2014 Edinburgh Medal is awarded to **Prof Mary Abukutsa-Onyango** – Professor of Horticulture at Jomo Kenyatta University of Agriculture and Technology – who for the past two decades has dedicated herself to finding sustainable solutions to the double burden of obesity and malnutrition that challenges Africa in the 21st century.

Rising rates of obesity and the rapid escalation in diet-related conditions such as diabetes, cancers and cardiovascular disorders are set alongside malnutrition resulting from scarcity of resources and problems of production. Prof Abukutsa-Onyango's work researching and promoting the agronomic and public health benefits of African indigenous vegetables and fruit is central to addressing many of these unique challenges.

A recipient of many awards for her work – including the renowned Elder of the Order of the Burning Spear – in addition to her research and promotion of agrobiodiversity, Prof Abukutsa-Onyango plays an active role in nurturing the next generation of African women scientists.

Her work plays an important part in addressing the challenge of long-term food security for the African continent and in improving the health, nutrition and livelihoods of millions of people.

The Edinburgh Medal is a prestigious award given each year to men and women of science and technology whose professional achievements are judged to have made a significant contribution to the understanding and well-being of humanity.

Prof Abukutsa-Onyango delivers the Edinburgh Medal Address, on 9 April; [p.40] and is special guest speaker at our *Feast of the Commonwealth* gala dinner at Our Dynamic Earth on 11 April [p.34].

PREVIOUS RECIPIENTS

- 2013 Prof Peter Higgs and CERN
- 2012 Dr James Hansen
- 2011 Prof Carl Djerassi
- 2010 Sir Alex Jefferies
- 2009 Prof Jonathan Beckwith
- 2008 Prof Chris Rapley
- 2007 Dr Richard Horton
- 2006 Prof James Lovelock
- 2005 Prof Colin Blakemore
- 2004 Prof Steven Rose
- 2003 Prof Wang Sung
- 2002 Dr Lise Kingo
- 2001 Sir John Sulston
- 2000 Prof Lynn Margulis
- 1999 Prof Jocelyn Bell Burnell
- 1998 Sir David Attenborough
- 1997 Prof Amartya Sen
- 1996 Prof Richard Levins
- 1995 Sir John Crofton
- 1994 Prof Manuel Pattarroya
- 1993 Prof Wangari Maathai
- 1992 Prof Heinz Wolff
- 1991 Prof Jane Goodall
- 1990 Prof Stephen J Gould
- 1989 Prof Abdus Salam



A VERY SHORT INTRODUCTION TO...FRACTALS

Get your teeth into some more science on your lunch break, this time with a mathematical bent. We are fascinated by patterns in nature, and perhaps none are more intriguing than examples of fractal geometry; in the complex contours of coastal forms, the outlines of clouds and the branching of trees. Mathematician **Prof Kenneth Falconer** from the University of St Andrews presents a bite-sized overview of fractal geometry, explaining its concepts, its beauty and its applications in science and economics.

1pm (1 hour) • £5, **student offer £2.50**

Summerhall, Red Lecture Theatre

Presented by Oxford University Press

PART OF FOOD FOR THOUGHT

PART OF THE READING EXPERIMENT



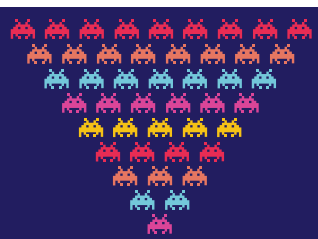
EXTINCT MAMMOTHS, ENDANGERED ELEPHANTS

What caused the extinction of the mammoth at the end of the last Ice Age – climate change, human hunting, or a combination of the two? Coinciding with the *Mammoths of the Ice Age* exhibition at the National Museum of Scotland, **Prof Adrian Lister** of the Natural History Museum in London asks whether understanding the mammoth's demise can help us to conserve their close relatives, the living elephants.

5.30pm (90 mins) • £8/£6, **student offer £4**

National Museum of Scotland, Auditorium

In association with the National Museum of Scotland



WHAT'S IN A GAME?

Computer games are everywhere, and more and more independent games are being produced. But are violent computer games corrupting our youth? Or are these games an artform that can improve our understanding of the world. Join **Mitu Khandaker**, Founder of Tiniest Shark; **Brian Baglow**, Head of Scottish Games Network; Lucky Frame Studio's **Yann Seznec** and **Gary Penn**, winner of the Games Media Legend Award and Head of Digital Development at Denki to discuss the impacts of the gaming revolution on society. Try out some games for yourself in an evening that promises to be as informative and enlightening as it is fun.

5.30pm (90 mins) • £8/£6, **student offer £4**

Summerhall, Dissection Room

PART OF MAKING IT... AT SUMMERHALL



MATHEMANIA!

Mathemania has broken loose! Equations have broken through the ivory towers of academia to infect every part of our daily lives. Banking, betting and betrothing now have maths in their DNA, and you're next. Your only antidote to this epidemic is to understand it. Luckily, stand-up mathematician and Australian Numeracy Ambassador **Simon Pampena** can help. He finds the whole situation hilarious... as will you!

5.30pm (1 hour) • £8/£6, **student offer £4**

Summerhall, Red Lecture Theatre



EDINBURGH MEDAL ADDRESS: HORTICULTURAL BIODIVERSITY, REPOSITIONING THE HIDDEN TREASURE

For the past two decades, **Mary Abukutsa-Onyango**, Professor of Horticulture at Jomo Kenyatta University of Agriculture and Technology, has dedicated herself to finding sustainable solutions to the double burden of obesity and malnutrition that challenges the African Continent.

At a time when obesity is rising at an alarming rate, and with it diet-related diseases like diabetes, cancers and cardiovascular disorders, her inspirational Medal Address sets out a proposed solution.

Advocating strategic repositioning of nutrient-rich African indigenous vegetables, she explains how farming and consumption of this 'treasure' holds the key to long-term food security for the continent and for better health, nutrition and improved livelihoods for millions of people. Oration from **Prof Louise Heathwaite** and vote of thanks from **Sir Muir Russell**.

7pm (1 hour) • £8/£6, **student offer £4** • City Chambers

PART OF GASTROFEST



BETTER BY DESIGN: DESIGNING BETTER HEALTHCARE FUTURES

Diabetes and other long term conditions are on the rise, as is our awareness of them, and this poses a human, social and economic challenge for Scotland. Our panel will debate the effectiveness of existing healthcare services for these conditions and explore what can be done to improve them, drawing from our understanding of anthropology, design and human behaviour. Join our experts as they discuss how best to address these challenges and provide optimum experiences and outcomes for all, while ensuring that you, the individual, is at the centre of any solutions.

8pm (90 mins) • £8/£6, **student offer £4** • National Museum of Scotland, Auditorium

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SCOTLAND

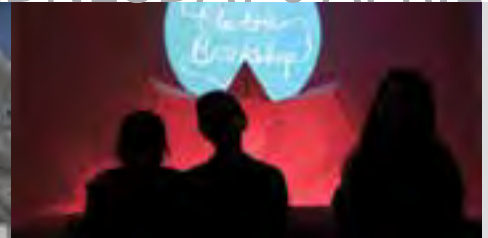


RICHARD WISEMAN'S BEGINNERS' GUIDE TO... ASTROBIOLOGY

Prof Richard Wiseman's entertaining and informative beginners' guides are back in 2014, teaching you everything you always wanted to know but were afraid to ask.

First up he tackles astrobio, with **Dr Zita Martins**, Royal Society University Research Fellow at Imperial College, sharing her views on how the first organisms on the only known home to life in the universe developed more than 3 billion years ago. Join Richard and Zita as they explore the origin, evolution, distribution and future of life in the universe and ask whether life beyond Earth exists and, if so, might humans be able to identify it?

8pm (90 mins) • £8/£6, **student offer £4** • Summerhall, Dissection Room



THE GREAT EXPLAINERS

In the 1990s, award-winning filmmaker, **Christopher Sykes**, made *Seven Wonders of the World*; a sort of scientific *Desert Island Discs* in which 14 of the world's most outstanding scientists shared with him their personal wonders.

Join Christopher in conversation with comedian **Robin Ince** as they reflect on some of the most vivid, entertaining and inspiring of these – from Miriam Rothschild on 'the jump of the flea' to Steve Jones on 'sex', James Lovelock on 'standing upright' and Alison Jolly on 'lemurs'— and explain how the ability of these master communicators to share their passion demonstrates that science 'only adds to the excitement, the mystery and the awe' of the world (Richard Feynman).

6.15pm (90 mins) • £10/8 • Filmhouse

In association with Filmhouse

EXTREME SOLDERING: SURFACE MOUNT COMPONENTS

Some hackers say surface mount soldering is hard because of the tiny components, but we'll show you it's really not that scary. Including your very own kit to build and take home, this session will show you the tricks and techniques to help you solder on.

Workshop repeated Wednesday 16 April • 6.30pm (2.5 hours)

£20 • Summerhall, Hacklab

Presented by Edinburgh Hacklab

LATELAB: ELECTRIC BOOKSHOP • PRESSED FOR TIME

Start your presses now. *Electric Bookshop* brings together people with a common interest in technology, literature, design and publishing. It's a discussion and demonstration forum for literary and technology types, as well as being a great social event.

Learn more about *Pressed for Time*, a publishing time-machine that provides unexpected and immersive experiences for intrepid book readers. Physically and aesthetically, the 'machine' produces an anachronistic mishmash of all forms of literature.

LateLab is a collaboration between Edinburgh International Science Festival, New Media Scotland and The University of Edinburgh's School of Informatics.

7pm for 7.30pm (3 hours) • Free (ticket required) • Informatics Forum

PART OF LATELAB

PART OF MAKING IT... AT SUMMERHALL

PART OF THE READING EXPERIMENT



ARE WE ALL CRAZY? OVER DIAGNOSING MENTAL DISORDERS

With more and more people being diagnosed with mental illness – from ADHD to depression – we ask where this deluge of disorders has come from. Is there an epidemic of psychological disorders or one of over-diagnosis? Is bipolar disorder a disease that can be chemically cured? Is it possible to alleviate human suffering without classifying it as a mental disorder? Join our panel as they answer these questions and more, and share their thoughts on this fascinating topic.

8pm (90 mins) • £8/£6, student offer £4 • Summerhall, Red Lecture Theatre

SCIENCE OF VAMPIRES

Ever wondered if there might be more to Dracula than a pale complexion and difficulties shaving? Filled with frightening folklore tales, blood sucking bats and sinister scientific stories from around the world, vampirologist **Kathryn Harkup** takes you on a spooky tour through the history of vampires, exploring in the process whether these bloodsucking baddies could be a real phenomenon.

8pm (1 hour) • £8/£6, student offer £4 • Summerhall,

Anatomy Lecture Theatre

A CONVERSATION WITH PETER HIGGS: CLOSE UP

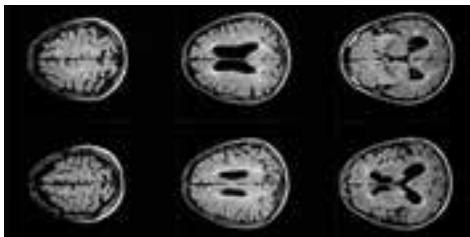
In 1964, as a young lecturer at The University of Edinburgh, **Peter Higgs** hypothesised the existence of a special particle—a boson that gives mass to everything in the universe. Fast-forward nearly 50 years and researchers at the European Organisation for Nuclear Research (CERN) recently confirmed the existence of this particle, named the Higgs Boson, leading to them and Peter being jointly awarded the Edinburgh Medal before Peter went on to receive the Nobel Prize in Physics in 2013.

Join **Prof Higgs** in conversation with fellow particle physicist and science writer **Prof Frank Close** as he discusses his life's work.

8pm (90 mins) • £10/£8, student offer £5 • Queen's Hall

Supported by





MULTIPLE SCLEROSIS: A VERY SCOTTISH PROBLEM?

Scotland is recorded as having the highest prevalence of multiple sclerosis in the world, with around 10,000 people living with the condition. But why is this? And what might the sun (or lack of it) have to do with it? Our informative *Healthy Lunches* series continues with researchers from the Anne Rowling Regenerative Neurology Clinic in Edinburgh explores the impacts, advances and future outlooks for this condition and **Anne Brown**, a Scots writer living with Multiple Sclerosis, reads from her informative and comical blog for the MS Society.

1pm (1 hour) • £5, **student offer £2.50** • National Museum of Scotland, Auditorium

PART OF HEALTHY LUNCHES



image: The Sugar Lab

A VERY SHORT INTRODUCTION TO... ROBOTICS

In the 1950s and 60s, scientists – and science fiction writers – predicted that intelligent robots would by now be integral to our lives. Despite failing to quite live up to these expectations, robotics has in fact had huge successes: from planetary exploration to manufacturing, storage and deliveries and now to first steps in our homes and hospitals.

The latest in our *Food for Thought* series lets you get your teeth into more science on your lunch break as **Prof Alan Winfield** from the Bristol Robotics Laboratory at the University of the West of England presents his bite-sized introduction to robotics.

1pm (1 hour) • £5, **student offer £2.50** • Summerhall, Red Lecture Theatre

Presented by Oxford University Press

PART OF THE READING EXPERIMENT

PART OF FOOD FOR THOUGHT

PART OF MAKING IT... AT SUMMERHALL

SPOTLIGHT ON: 3D AT THE MUSEUM

Meet National Museum of Scotland curator **Klaus Staubermann** and **Tom Seatter** from Heriot-Watt University and discover how the Museum is using 3D printing technology to find new ways to engage with the National Collections, from archaeological artefacts to working machinery and modern jewellery.

2pm (1 hour) • Free (ticket required) • National Museum of Scotland, Learning Centre Level 4

Presented by the National Museum of Scotland

PART OF MAKING IT... AT THE MUSEUM



METHODICAL FROG HOPPING

Good problem-solvers have been shown to have greater success in life and **Dr Thusha Rajendran** and **Peter McKenna** from Edinburgh's Heriot-Watt University want to find out why this is and how these skills emerge. Based on the theory that physical interaction can improve our problem-solving skills, participants of all ages are encouraged to find out more about this idea and take part in an interactive, movement-based computer game that explores problem-solving behaviour.

5.30pm (1 hour) • £8/£6, **student offer £4** • Summerhall, Anatomy Lecture Theatre

Presented by Heriot-Watt University



LATELAB: THE INTERNET OF THINGS THAT MATTER

How does data change our relationship with physical 'things'? *The Internet of Things* exploits new technologies to link physical artefacts with data across social and technical networks. Join the Design Informatics Research Group to explore this new technology.

From teapots that you can haggle with in Oxfam shops or shelves that shake when earthquakes take place on the other side of the world, to clocks that print you a postcard of something that happened in the past – let's reflect upon the implication on our social lives.

7pm for 7.30pm (3 hours) • Free (ticket required) • Informatics Forum

PART OF LATELAB



CHOOSING A HEALTHY FUTURE?

On 18 September Scotland must make a decision: remain part of the UK or chose independence. Our *Scotland Decides* series asks what this might mean for some key science-related issues and the first topic under the microscope is healthcare. Broadcaster **Lesley Riddoch** is joined by **Dr James Mittra** of the Innogen Institute; **Dr Richard Simpson MSP** and **Dr Jean Turner**, former independent MSP and Chair of the Scottish Patients Association, along with policy makers and health professionals, to consider the health challenges faced by the population. They will examine how the people of an independent Scotland might want their healthcare to be provided, discussing the future of free prescriptions, medical training and hospital services.

8pm (90 mins) • £8/£6, **student offer £4** • National Museum of Scotland, Auditorium

In association with the National Museum of Scotland

PART OF SCOTLAND DECIDES

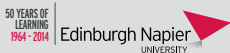


LOL-GARITHMS!

Logarithms are turning 400 so it's time to party! First introduced by Edinburgh's John Napier in 1614, the scale of their importance cannot be underestimated. Navigators used them during the age of discovery; scientists built theories with them in the scientific revolution and modern applications range from measuring earthquakes to forensic accounting – logarithms are everywhere. Learn how to spot one with stand-up mathematician **Simon Pampena** as he celebrates the 400th anniversary of the logarithmic scale. This event will be an order of magnitude more fun than you might imagine!

5.30pm (90 mins) • £8/£6, student offer £4 • National Museum of Scotland, Auditorium

Supported by



RICHARD WISEMAN'S BEGINNERS' GUIDE TO... FERMAT'S LAST THEOREM

What is the most notorious problem in the history of mathematics, surrounded by one of the greatest stories imaginable? In the second of this year's popular beginners' guides, writer and broadcaster **Simon Singh** shares the answer to this riddle with **Prof Richard Wiseman**. A fascinating story of beautiful and intriguing problems, tormented mathematicians and a challenge that confounded the world's greatest minds for 358 years, Simon will explain what the theorem is, who invented it, who eventually proved it. Plus how writing a book about *Fermat's Last Theorem* taught him, a physicist, to love mathematics for its own sake.

5.30pm (1 hour) • £8/£6, student offer £4 • Summerhall, Dissection Room



PARTY HARD! THE MATHS OF CONNECTIONS

How many guests need to come to a party to guarantee at least five will know one another or at least five will be mutual strangers? Host **Prof Keith Ball**, Scientific Director of the International Centre for Mathematical Sciences, talks to **Dr Colva Roney-Dougal**, Senior Lecturer in Pure Mathematics at the University of St Andrews, about the mathematics of connections; from friendship, through marriage to the spread of disease. Along the way Colva will show how infinity plays some very peculiar tricks and discover some unexpected links between mathematicians and Hollywood stars.

5.30pm (1 hour) • £8/£6, student offer £4 • Summerhall, Red Lecture Theatre

Presented by the International Centre for Mathematical Sciences

PART OF THE READING EXPERIMENT



SIN ACADEMY

AGES 18+

Merging science and sin, author and 'hedonism expert' **Zoe Cromier** of Guerilla Science leads an interactive celebration of the unholy trinity of sex, drugs and rock'n'roll as she explores the science of hedonism. From tortoiseshell condoms to superstar athletes on hallucinogens, expect stories from some of the more sinful annals of science. But you don't get off that lightly! Get up close and personal with science in a series of interactive experiments that will give you the chance to smell your way to your perfect partner, extract DNA and feel electricity when you kiss. Naughty? Perhaps, but rather nice! Hosted by science songstress **Helen Arney**.

8pm (2 hours) • £10/£8, student offer £5 • Summerhall, Dissection Room



THE SCIENCE OF MYTHOLOGICAL MYSTERY

Mythological creatures are strange, fantastic and often frightening. They are also surprisingly consistent in their forms. Are they purely products of our imagination, and what can science teach us about where they may have come from?

Matt Kaplan, author of *The Science of Monsters* and a respected science journalist (regularly contributing to *National Geographic*, *New Scientist*, *Nature*, and *The Economist*) presents his fascinating insights into the origins of myths like the famous Cretan Minotaur, and the amazing civilisations of the past.

8pm (1 hour) • £9/£7 • Summerhall, Cairns Lecture Theatre

Part of *The Minotaur* performance project by Rupert Thomson, in association with Edinburgh International Science Festival



STUDENTS!
LOOK OUT FOR
HALF-PRICE
TICKET
OFFERS

PART OF THE READING EXPERIMENT



POWER OF TEN: INVENTING LOGARITHMS

Four hundred years ago, Scottish mathematician John Napier's pioneering work on logarithms enabled more calculations to be completed in just one hour than had previously been achieved in a day. From the introduction of the decimal point to the development of slide rules, this exhibition explores how Napier's revolutionary innovations advanced and influenced mathematics from the 17th century to the present.

Until Sunday 6 July • Free (drop-in) National Museum of Scotland, Grand Gallery

Presented by the National Museum of Scotland

RICHARD WISEMAN'S BEGINNERS' GUIDE TO... THE EARTH

Prof Richard Wiseman's entertaining and informative beginners guides are back for another year... Join Richard in discussion with earth scientist and broadcaster **Hermione Cockburn** (BBC, *Coast*) as they travel back through geological time to find out about our planet's fascinating past. Along the way discover how geology began here in Edinburgh 200 years ago, what it takes to become a fossil, who found the first dinosaur and why landscapes look the way they do.

1pm (1 hour) • £8/£6, student offer £4

National Museum of Scotland, Auditorium

A VERY SHORT INTRODUCTION TO... ICE AGE

More *Food for Thought* as our short sessions of science for your lunch break continue. Studies of the environmental shifts that took place during the Quaternary Period Ice Age have revolutionised our understanding of Earth's landscapes and ecosystems. Join **Jamie Woodward**, Professor of Physical Geography at the University of Manchester for a bite-sized overview of the Ice Age in which he explores the evolution of ideas, major debates and research methods used to investigate this fascinating era of our geological past.

1pm (1 hour) • £5, student offer £2.50

Summerhall, Red Lecture Theatre

Presented by Oxford University Press

HORMONES AND THE MATING GAME

All animals reproduce, but what drives this urge? How do we choose a mate? Is libido treatable? Join the Society for Endocrinology and its panel of experts – **Profs Philippa Saunders** and **Gareth Leng** from The University of Edinburgh and **Dr Richard Quinton**, Consultant Endocrinologist from the Newcastle upon Tyne Hospital's NHS Foundation Trust – to discuss whether we are all slaves to our hormones, or whether there's more to what makes us trust, lust, love and cheat.

5.30pm (90 mins) • £8/£6, student offer £4

National Museum of Scotland, Auditorium

Presented by the Society for Endocrinology

PART OF FOOD FOR THOUGHT

PART OF THE READING EXPERIMENT



FEAST OF THE COMMONWEALTH

AGES 18+

The Commonwealth Games brings an international flavour to Scotland in 2014 and we think that this calls for a special science-infused celebration. With food bringing people together like nothing else, what better way to celebrate the interface of science and food than with a fabulous feast marking '100 days to the Games'.



Join leading chef **Neil Forbes**, Edinburgh Medal recipient **Prof Mary Abukutsa-Onyango** and local and global scientists and culinary stars at a unique gala dinner inspired by the unique flavours and amazing nutritional functions of foods. Enjoy a specially created menu, browse our producers market and explore the Ozone and Rainforest where scientists and chefs share culinary science stories from across the Commonwealth.

7pm (5 hours) • £75 (includes a 3 course meal and wine) • Our Dynamic Earth

In association with Our Dynamic Earth

An official Culture 2014 event.

Supported by



Queen Margaret University
EDINBURGH

PART OF GASTROFEST

LATELAB: ENCOUNTERS

Encounters at *LateLab* takes a hot topic in neuroscience and pairs speakers with different perspectives on a shared theme. In a salon-style evening of presentations, conversation and discussion our experts will share, question each other and debate among themselves and with you, the audience.

Fun, informative and often surprising, no two encounters are ever the same but they do all guarantee an evening of cerebral stimulation of the most pleasant kind.

LateLab is a collaboration between Edinburgh International Science Festival, New Media Scotland and The University of Edinburgh's School of Informatics.

7pm for 7.30pm (3 hours) • Free (ticket required) • Informatics Forum

PART OF LATELAB



WHO AM I?

What does it mean to be an individual and what is it exactly that makes each one of us who we are? **Prof Daniel Davis**, one of the UK's leading immunologists, leads a discussion featuring eminent evolutionary psychologist **Prof Robin Dunbar** as they discuss the compatibility gene – the gene that varies most from person to person – and share their thoughts on what makes an individual.

5.30pm (90 mins) • £8/£6, **student offer £4** • Summerhall, Dissection Room

In association with Penguin Allen Lane

THE MAN WHO COULDN'T STOP

Have you ever had a strange urge to jump from a tall building, or steer your car into oncoming traffic? You are not alone. Writer **David Adam** has suffered from obsessive compulsive disorder for 20 years. Join him for an unflinchingly honest account of his experiences, drawing on recent research, historical accounts and patients' experiences to present an account that will explore how we deal with intrusive thoughts and challenge your thinking about mental illness.

5.30pm (90 mins) • £8/£6, **student offer £4** • Summerhall, Red Lecture Theatre

Presented by Picador/Macmillan

THE SIMPSONS AND THEIR MATHEMATICAL SECRETS

Join best-selling author and broadcaster **Simon Singh** as he explores how the mathematically gifted writers of this TV cartoon have smuggled mathematical concepts into their storylines. Discover how *The Simpsons* has brought everything from calculus to geometry, from pi to game theory, and from infinitesimals to infinity to life in unusual and entertaining ways.

5.30pm (1 hour) • £8/£6, **student offer £4** • Summerhall, Cairns Lecture Theatre

Supported by



PART OF THE READING EXPERIMENT

PART OF THE READING EXPERIMENT



SIX WAVES OF COMPUTING

Dr Hermann Hauser, physicist and Fellow of the British Computer Society, the Royal Society, the Institute of Physics and the Royal Academy of Engineering, explores the 'six waves' that make up the history of computing. Beginning with the computer mainframe, he will explain the development of the mini-computer, the workstation, the PC, the smartphone and the Cloud, and ubiquitous computing and machine learning.

8pm (90 mins) • £8/£6, **student offer £4** • National Museum of Scotland, Auditorium

Presented by the British Computer Society

PUB SCIENCE

AGES 18+

The pub is a cornerstone of British culture and *Pub Science* is a cabaret-style celebration of this uniquely British experience. Discover beer's role in our civilisation, explore (and sample!) what makes the perfect brew and find out if beer goggles are a real phenomenon. With psychologist **Dr Amanda Ellison**, beer writer **Pete Brown** and **Dougal Sharp**, founder of The Innis & Gunn Brewing Company. Hosted by science songstress **Helen Arney**.

8pm (90 mins) • £10/8 (includes beer samples) • Summerhall, Dissection Room

Supported by



LADY SCIENTISTS STITCH AND B*TCH

AGES 16+

Once a year, lady scientists from across the ages hop in a time machine and unite to share funny, heartbreaking and illuminating stories about what it means to be a woman scientist at a certain time in history. Oh, and they also come together to knit. But this is no genteel sewing circle – this one shares hilarious, horrible and human stories.

As Cecilia Payne-Gaposchkin, who discovered that stars are mainly composed of hydrogen, so pithily puts it: 'It's hard out there for an astronomer and astrophysicist whose achievements were overlooked, then stolen by male colleagues. Ass hats.'

8pm (2 hours) • £6/4 • Scottish Storytelling Centre

Presented by Illicit Ink Skyground

PART OF MAKING IT... AT THE MUSEUM

PART OF GASTROFEST



CORIN SWORN

ALL AGES

An exhibition featuring newly commissioned work by Glasgow-based artist **Corin Sworn**.

This breathtaking collection of installation and photographic work is inspired by natural plant dyes and dying techniques traditional to Scotland and was informed through research into plant specimens and botanical collections housed within the Royal Botanic Garden's extensive herbarium collection.

Saturday 12 April–Sunday 22 June

10am–5.30pm • Free (drop-in) • Royal Botanic Garden Edinburgh, Inverleith House

Presented by Royal Botanic Garden Edinburgh



TAKING ARDUINO TO THE NEXT LEVEL

If you're an experienced Arduino user, bring your project and your laptop and let Edinburgh Hacklab help you take your programming to the next level. This all day session will cover a wealth of advanced Arduino topics: find out how to update a display without missing any button presses, learn how to make your project talk to advanced sensors and devices and discover ways to make your project permanent and avoid a rats' nest of wires.

**Workshop repeated Tuesday 15 April
10.30am (6.5 hours) • £50 • Summerhall, Hacklab**

Presented by Edinburgh Hacklab

PART OF MAKING IT... AT SUMMERHALL

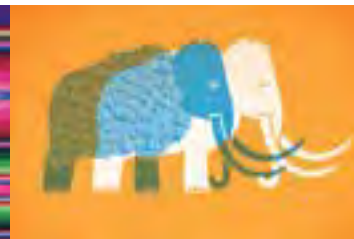


COLOMBIAN WISE PEOPLE AND THEIR MEDICINE

A companion to last week's introductory workshop, this one explores the traditional medicine of the wise people of the Colombian Amazon forest. From the role of the *maloca* (longhouse) in ritual and as a centre for daily life and healing to the training of *sabedores* (knowledgeable ones), it will introduce the vast variety of plants used for prevention of illness and healing, and ritual. Then take a tour of the Botanic's glasshouses to see key plants used by the wise people.

1pm (3 hours) • £30 • Royal Botanic Garden, 20a Inverleith Row (offices entrance)

Presented by Royal Botanic Garden Edinburgh



MAMMOTH POO DETECTIVES: LAB RATS FOR ADULTS

Why should kids have all the fun? Explore Ice Age environments through demonstrations and hands-on messy challenges, and use poo clues to track down mammoths and mastodons.

2pm and 3.30pm (1 hour) • £3

National Museum of Scotland, Learning Centre Level 4



SCIENCE NEEDS YOU!

Scientific research is no longer confined to the lab: people from all walks of life are using their time, energies and abilities to join the worldwide citizen science revolution. In this family-friendly event, researchers from the Scottish Environmental Protection Agency (SEPA) are joined by seasoned citizen scientists to explore the principles of the work. Get involved and discover local projects that are enabling ordinary people to make extraordinary contributions to scientific understanding.

5.30pm (90 mins) • £8/£6, student offer £4

Summerhall, Cairns Lecture Theatre

Supported by



MAKING WAVES & TURNING THE TIDES

A unique opportunity to visit Scotland's newest major marine research facility. Experience a real marine test in action in The University of Edinburgh's giant wave and current tank, and find out about the past, present and future of marine renewable energy research and potential in Scotland with **Prof Robin Wallace** of The University of Edinburgh and **Stuart Brown** of FloWave TT.

5.30pm (90 mins) • £8/£6 • FloWave TT All-Waters marine test facility at The University of Edinburgh King's Buildings

Presented by The University of Edinburgh



SYNTHETIC AESTHETICS: HOW WOULD YOU DESIGN NATURE?

A multimedia, multi-disciplinary evening bringing together scientists and artists to explore the new science of synthetic biology through short talks and demonstrations. Find out more about its mechanisms and applications through models, animations and dance as the process of engineering design with DNA is brought to life. Featuring **Prof Alistair Elfick**, Professor of Synthetic Biological Engineering at The University of Edinburgh.

6pm (90 mins) • £8/£6, student offer £4

Summerhall, Dissection Room

Presented by The University of Edinburgh



LATELAB: THE TASTE OF BLUE

What do Richard Feynman and Stevie Wonder have in common? Both have the brain condition synaesthesia which gives rise to sensory connections between unrelated experiences.

Enter the mixed-up world of the synaesthete where one sense leads to another and the whole world takes on a different meaning. Do numbers have a taste or colours have a smell? Join us on a multimedia and multi-sensory voyage to explore the extra connections in the brain of a synaesthete.

LateLab is a collaboration between Edinburgh International Science Festival, New Media Scotland and The University of Edinburgh's School of Informatics.

7pm for 7.30pm (3 hours) • £8/£6

Informatics Forum

PART OF MAKING IT... AT SUMMERHALL

PART OF LATELAB



FACE OFF: MAN VS MACHINE

Artist and designer **Dominic Wilcox's** powerful and imaginative design projects provide inspiring new perspectives on the made world. In his spare time he likes to battle against 3D printers in real-life man vs machine challenges. Watch live as Dominic and his hand-picked team of artists and designers take on three 3D printers. Can a 3D printer challenge man's natural making skills?

2pm - Free (drop-in) - National Museum of Scotland, Grand Gallery



CAN YOU HEAR ME?

Join **Dr Owen Brimijoin** from the MRC Institute of Hearing Research as he explores the universal experience of trying to follow a conversation in a noisy place. Take part in an en-masse experiment that tests how we decode speech in noise and discover how our fragile, precious and surprisingly complex sense of hearing works through audio and video examples. Join in at 100yearsofamplifiedmusic.org

3pm (90 mins) - £8/£6, student offer £4
National Museum of Scotland, Auditorium
 Presented by the Medical Research Council



IN TWO MINDS?

As Scotland prepares for September's referendum, this fascinating event, the second in our *Scotland Decides* series, explores the psychology of decision-making and uncovers the factors that influence our choices. **Dr Tiffany Jenkins** is joined by speakers including **Prof John Curtice**, the University of Strathclyde, and **Dr Jan Eichhorn** of The University of Edinburgh, to reveal how campaign strategies influence voters, the impact of 16 year-old voters, the relationship between informed choice and unconscious bias and how our socio-economic background can affect our decisions.

5.30pm (90 mins) - £8/£6, student offer £4 - National Museum of Scotland, Auditorium
 In association with the National Museum of Scotland

PART OF MAKING IT... AT THE MUSEUM

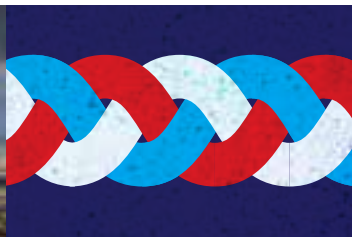
PART OF SCOTLAND DECIDES



A 'GOOD DEATH'

Advances in modern medicine and increased life expectancy mean we often see death as a negative outcome of our lives, but should we really be planning ahead? **Dr David Harrison**, Professor of Pathology at The University of St Andrews discusses how our bodies die and **Dr Kirsty Boyd**, a Consultant in Palliative Medicine at NHS Lothian and The University of Edinburgh, explores how scientific knowledge and open discourse can encourage us all to accept dying and achieve a 'good death'.

8pm (90 mins) - £8/£6, student offer £4
National Museum of Scotland, Auditorium
 Presented by the Royal College of Physicians of Edinburgh



TRIPLE HELIX REFERENDUM DEBATE

What would an independent Scotland mean to students and researchers? A range of speakers discuss the implications independence could have in terms of funding, academic opportunities, and the international reputation of Scottish universities. This event will be hosted by **The Triple Helix**, a student society at The University of Edinburgh. Join us for this dynamic discussion followed by a Q&A session.

8pm (90 mins) - £8/£6, student offer £4
Summerhall, Red Lecture Theatre
 Presented by The Triple Helix



PRINCIPLE OF UNCERTAINTY

One physicist faces the limitations of science as a belief system... Prof La Page's world is populated by the wonders of quantum physics, but when a great tragedy happens in his personal life, his science tantalisingly promises him parallel universes, but falls short of guiding him to the one where that crucial death has not occurred. Certainty is not of this World!

Written and performed by **Dr Andrea Brunello**, PHD in Quantum Mechanics from Cornell University, *The Principle of Uncertainty* boldly goes where no theatre performance has gone before: an exploration of human emotion and loss whose premises are firmly based on rigorous quantum physics principles.

8pm (1 hour) - £8/£6, student offer £4
Summerhall, Anatomy Lecture Theatre



MADE UP?

Separate the science from the snake oil in this interactive evening in which science meets beauty. Make your own make-up with **Brigitte West** of the Beauty by the Geeks science and beauty blog team. Meet historians of art and ethnomedicine to discover some fascinating applications of cosmetics through the ages. Explore the science of attraction and why we use cosmetics with psychologist **Dr Martin Tovee** of Newcastle University. A unique hands-on opportunity to not only investigate everyday cosmetics but to make some yourself.

8.30pm (2 hours) - £10/£8 - Summerhall, Dissection Room

PART OF SCOTLAND DECIDES



THE HANGOVER HYPOTHESIS

We all have a routine for the morning after the night before, but is it really effective? Bring your own hangover along (optional!) and join us as we attempt to stretch, slurp and scoff it into submission. Under the supervision of **Milton Crawford**, author of *The Hangover Cookbook* (sic), we'll try morning after cocktails, a spot of yoga with **Linda Douglas** and – experiment with the classic cure – a bacon roll. Learn what science has to say and separate the myth from reality.

11am (2 hours) - £10/8 (includes taster cocktail and bacon roll or vegetarian option) - Summerhall, Dissection Room

PART OF GASTROFEST



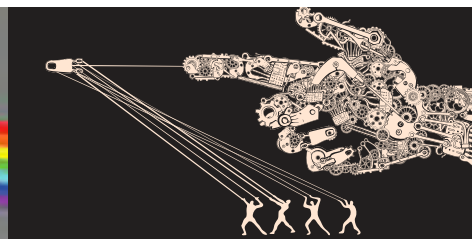
MAXWELL ON LIGHT AND COLOUR

James Clerk Maxwell was undoubtedly Scotland's greatest physicist. His contributions to electricity, magnetism and the theory of heat have ensured his immortality but he lavished equal imagination and insight into his pioneering contributions to the theory of light and colour throughout his brief, but remarkable, life.

Prof Malcolm Longair, former Astronomer Royal for Scotland, former Director of Cavendish Laboratory, Cambridge and Trustee of the James Clerk Maxwell Foundation, is an unashamed Maxwell enthusiast, with a particular interest in his research into light and colour. In a profusely illustrated and engaging event, he will share this enthusiasm and help add a little colour to your Sunday afternoon.

3pm (90 mins) - £8/£6, student offer £4 - National Museum of Scotland, Auditorium

Supported by the James Clerk Maxwell Foundation



HELLO SCIENCE, MEET POLITICS

We live in a civilisation built on human imagination and scientific endeavour, and yet some write that science should not muddy itself with politics. Is it really possible for the scientists to leave the politics to politicians? And should they?

Comedian **Robin Ince** asks special guests from both sides 'isn't it time to see more scientists – and fewer PR people – in our parliaments?' When politics is about being cocksure and science about doubt, how can we convey to the public the important issues on climate, education, medical research without getting bogged down in spin?

3pm (90 mins) - £8/£6, student offer £4 - Summerhall, Dissection Room



TAM DALYELL PRIZE LECTURE: MY LI-FI REVOLUTION

In this year's Tam Dalyell Lecture, **Prof Harald Haas**, Chair of Mobile Communications at The University of Edinburgh, reveals an amazing innovation that could change wireless communications forever. The Li-Fi system uses standard light-emitting diodes (LEDs) to transmit electronic data signals, which will enable users to access the internet through the ordinary lighting systems in schools, workplaces and homes. This revolutionary invention has the potential to bring cheap, energy efficient and super-secure wireless access to the world. Join Harald to hear about how the revolution started here in Edinburgh.

6pm (90 mins) - Free (ticket required) - Playfair Library

Presented by The University of Edinburgh



LATELAB: GASTROLAB - SLOW FOOD

This *GastroLab* will focus on slow food beginning with a screening of *Lifecycles* by **Matthew Moore**. Part of the larger effort of the Digital Farm Collective, these short time-lapse films educate consumers on the produce they are purchasing by showing the growing process as it happens in the field.

Simon Yuill will talk about his *Stackwalker* project, focusing on crofting communities and migrant workers in Scotland's food and fish processing industries. **Kate Rich** and **Kayle Brandon** will unpack the secret recipe of cola using essential oils to enable the audience to assemble the drink. Perfect to wash down Black Market Pudding by **John O'Shea**.

LateLab is a collaboration between Edinburgh International Science Festival, New Media Scotland and The University of Edinburgh's School of Informatics.

7pm for 7.30pm (3 hours) - £10/£8 - Informatics Forum

PART OF LATELAB

PART OF GASTROFEST



GOTTA GET UP TO GET DOWN

If you had to express your personality through dance, what would you be? A cheeky Charleston? A proud Paso Doble? Or a cocky twerker? Let dance psychology expert **Dr Peter Lovatt**, AKA Dr Dance, show you how the way you are and the way you feel can influence how you move your body. No need for a leotard and dancing shoes are optional in this terpsichorean tour of wonder.

8pm (90 mins) - £10/£8 - Summerhall, Dissection Room



BARBED WIRE BETWEEN CULTURES?

Fifty years on from CP Snow's (in)famous Rede Lecture, comedian **Robin Ince** asks if barbed wire still separates the 'two cultures' of the sciences and humanities. While both art galleries and science museums are packed every weekend, science is under-represented in mass media, but aren't both disciplines united by their desire to explain and express the world? Arts graduate turned science enthusiast, **Helen Keen**, makes one woman shows about space and robotics while **Matthew Cobb** is a Professor of Zoology who both studies gene evolution and paints with maggots. They join Robin to explore how art and science can together convey cosmic ideas, and plot how to tear down the barbed wire once and for all.

5.30pm (90 mins) - £8/£6, student offer £4 - National Museum of Scotland, Auditorium

In association with the National Museum of Scotland

BOOSTING THE BRAIN; HOW FAR SHOULD WE GO?

From 'smart' drugs to cybernetic implants, the options for enhancing brain function are ever expanding but just how far are we prepared to go to boost our brains? **Profs Barbara Sahakian** and **Alasdair Coles**, neuroscientists from the University of Cambridge; writer, philosopher and former physician **Prof Raymond Tallis** and author and science communicator **Dr Pete Moore** discuss the latest developments in this fascinating, often controversial area and ponder some of the ethical and scientific challenges they pose.

5.30pm (90 mins) - £8/£6, student offer £4 - Summerhall, Dissection Room

Presented by The Faraday Institute

In association with Oxford University Press

FROM YAWN TO DAWN

We spend about a third of our lives asleep, and yet we still don't fully understand what sleep is and why we need it.

Dr Renata Riha, Consultant in Sleep Medicine at the Royal Infirmary Edinburgh, leads a panel of experts in an engaging interactive discussion with the audience to examine the place of sleep in our lives. What is our relationship with the land of nod? What makes you sleepy, and what are the common causes of sleepiness and sleep disorders? This event is guaranteed NOT to send you to sleep!

5.30pm (90 mins) - £8/£6, student offer £4 - Summerhall, Red Lecture Theatre

Presented by the Sleep Research Group

PART OF THE READING EXPERIMENT



PRINCIPLE OF UNCERTAINTY

One physicist faces the limitations of science as a belief system... Prof's La Page's world is populated by the wonders of quantum physics, but when a great tragedy happens in his personal life, his science tantalizingly promises him parallel universes, but falls short of guiding him to the one where that crucial death has not occurred. Certainty is not of this World!

Written and performed by **Dr Andrea Brunello**, PHD in Quantum Mechanics from Cornell University, *The Principle of Uncertainty* boldly goes where no theatre performance has gone before: an exploration of human emotion and loss whose premises are firmly based on rigorous quantum physics principles.

8pm (1 hour) - £8/£6, student offer £4 - Summerhall, Anatomy Lecture Theatre

ALBERT EINSTEIN: RELATIVELY SPEAKING

Join Albert, the genius behind the übercoolest moustache in science, for a lecture like none you've ever attended. The eccentric theoretical physicist is accompanied by his two wives and mum on the piano, and by guest rapper MC Squared, as he quantum leaps us through two world wars, two theories of relativity, and the deployment of two very big bombs. Warning: features the wurst sausage joke ever.

If you missed this hour of songs and silliness during Fringe, DON'T miss it again or you'll be (relatively) sorry you did!

8pm (1 hour) - £10/£8 - Summerhall, Cairns Lecture Theatre

Presented by Tangram Theatre Company

PHYSICS TO BLOW YOUR MIND

Join top astrophysicists from the Royal Observatory Edinburgh and The University of Edinburgh for a curious journey through some of the most mysterious and intriguing secrets of the cosmos.

Dr Catherine Heymans has used some of the world's best telescopes to map out the invisible dark matter in our Universe and will explore theories around this dark enigma. Then **Prof Andrew Liddle** will take you on a mind-bending journey through theories of the multiverse; a place where the laws of nature are not as we know them to be and which may even contain many perfect copies of ourselves.

8pm (90 mins) - £8/£6, student offer £4 - National Museum of Scotland, Auditorium

Presented by the Royal Observatory Edinburgh

THE CULTURE COLLIDER

The Writers' Bloc laboratory of writers, musicians and artists brings to the Festival an evening full of tales of science and surprises that detonate the cultural divide. Knitting music with maths, dropping purls from string theory and rolling loaded dice across blueprints, join this Edinburgh-based performance writers collective as they grab you by your molecules with a mind-blowing fusion of science and literature. Explore a world where speed dating pulls strange attractors and Frankenstein goes to Hollywood, and discover the hidden interactions between haggis and Hawking.

8pm (2 hours) - £8/£6, student offer £4 - Summerhall, Red Lecture Theatre

PART OF THE READING EXPERIMENT



A VERY SHORT INTRODUCTION TO...BACTERIA

More *Food for Thought* on your lunch break. Get your teeth into some fascinating science with **Prof Sebastian Amyes** from The University of Edinburgh as he introduces bacteria: their origins and evolution and their function in the environment and disease, including the ever-increasing challenges of confronting bacterial resistance to antibiotics.

1pm (1 hour) • £5, **student offer £2.50**

Summerhall, Red Lecture Theatre

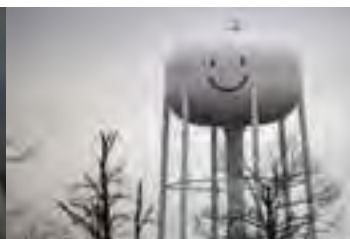
Presented by Oxford University Press



GET UP OUT OF YOUR ROCKING CHAIR GRANDMA

Have you ever felt stuck in a rut and not known how to get out of it? Are you bored with your lover, fed up feeling frumpy and desperate to do something different? All you have to do is dance: everyone is born to do it; even those who claim to have two left feet! Based on scientific research, **Dr Peter Lovatt**, AKA Dr Dance, will teach you five sets of dances that could help you to find romance, be more sociable, lift your mood, and think differently.

5.30pm (90 mins) • £10/£8 • Summerhall, Dissection Room



HAPPINESS HACKER: CARNEGIE CHALLENGE DEBATE

Are you happy? Since Abraham Maslow created his 'Hierarchy of Needs' in the 1940s we have developed an understanding of the diverse and powerful range of needs our happiness requires, yet many still don't feel we are achieving it. Join **Prof Ruut Veenhoven**, Emeritus Professor of Social Conditions for Human Happiness at Erasmus University, Rotterdam and other experts to discuss how we re-wire our brain and suggest some life-hacks for a happier world.

5.30pm (90 mins) • £8/£6, **student offer £4**

Summerhall, Anatomy Lecture Theatre

Supported by



CABARET OF DANGEROUS IDEAS

From writing via epigenetics and evolution to 3D printing, the history of scientific endeavour is marked out by daring discoveries and notions that have been both the catalyst for great advances in the human story and the cause of considerable disaster. Hosted by **Susan Morrison**, broadcaster, comedian and director of *Previously...* Scotland's history festival, this cabinet of curiosities aims to provoke debate while raising questions around some of the dangerous ideas of the present and future.

8pm (2.5 hours) • £10/£8 • Summerhall, Dissection Room

In association with *Previously...* Scotland's history festival

PART OF FOOD FOR THOUGHT

PART OF THE READING EXPERIMENT

TUESDAY 15 APRIL



CELLS TO CIVILIZATIONS

What are the connections between evolving microbes, an egg that develops into an infant, and a child who learns to walk and talk? Join **Enrico Coen**, shortlisted author for the 2013 Royal Society Winton Prize for Science Books, as he explores the four great life transformations – evolution, development, learning, and human culture – with **Andrew Millar**, Chair of Systems Biology at The University Edinburgh.

5.30pm (90 mins) • £8/£6, **student offer £4**

National Museum of Scotland, Auditorium

Presented by the Royal Society, as part of the Winton Prize for Science Books



SIMON WATT'S FROGS AND FRIENDS

Frogs are brilliant, but sadly they are dying out. In this comedic lecture, biologist, writer, science communicator and TV presenter **Simon Watt** (*Inside Nature's Giants*) explains why frogs are better than most people he knows, exploring some of the amazing ways studying them has changed the world and showing why we should be protecting this fascinating, if often freaky, animal. Join the frog fan club.

5.30pm (1 hour) • £8/£6, **student offer £4**

Summerhall, Dissection Room



VIRUS HUNTERS

The quest to uncover the origins of HIV took in African rain forests, hospital intensive care wards and research laboratories and involved painstaking research, worldwide collaboration, state-of-the-art laboratory experimentation and risky fieldwork.

Edinburgh-based microbiologist and author **Prof Dorothy Crawford** shares this complex and fascinating scientific detective story and is joined in discussion by leading evolutionary biologist **Prof Paul Sharp**.

5.30pm (90 mins) • £8/£6, **student offer £4**

Summerhall, Red Lecture Theatre

In association with Oxford University Press



STRANGER THAN FICTION: WHO SHOULD WRITE ABOUT SCIENCE?

Who is best placed to write about science for the general public – scientists, who know what they're talking about; or writers, who know how to express ideas clearly and readably? Our panel of distinguished authors have written books about botany, chemistry, alchemy and scientific history and biography. Join them for a conversation about knowing and communicating. Are they scientists, or writers, or both?

Hosted by **Stranger Than Fiction**, Edinburgh's only organisation devoted to writers of non-fiction.

5.30pm (90 mins) • £8/£6, **student offer £4**

Summerhall, Anatomy Lecture Theatre

PART OF THE READING EXPERIMENT

PART OF THE READING EXPERIMENT

PART OF THE READING EXPERIMENT



THE MYSTERY OF THE PICKLE JAR

Film, television and literature have made us increasingly familiar with forensic medicine and science. This fascinating interactive presentation by **Dr Tim Squires** from The University of Edinburgh requires no prior knowledge or magnifying glass, but will give enquiring minds the chance to explore the scientific principles behind the fictional glamour, assessing the evidence and discovering the complicated analytical techniques that might solve *The Mystery of the Pickle Jar*.

8pm (90 mins) • £8/£6, **student offer £4** • Summerhall, Anatomy Lecture Theatre

TUESDAY 15 APRIL



STROKE: INFORMATION AND REHABILITATION

Around one in six people in Scotland will have a stroke, with about 12,500 having one every year. The damage caused by a stroke can be widespread and long lasting, and rehabilitation can be slow but it is the topic of much on-going scientific research. Join **Dr Nick Ward** from UCL Institute of Neurology as he explores the reorganisation of brain networks to support recovery; **Lorraine Ayres**, Group Developmental Manager of national charity Different Strokes and **Prof Gillian Mead** from The University of Edinburgh who will discuss the importance of exercise after a stroke.

1pm (1 hour) • £5, **student offer £2.50**
National Museum of Scotland, Auditorium

PART OF HEALTHY LUNCHES

A VERY SHORT INTRODUCTION TO... ENGINEERING

In this *Food for Thought* event, **David Blockley**, Emeritus Professor and Senior Research Fellow at the University of Bristol, explores the nature and practice of engineering, its history, scope, and relationship with art, science and technology.

This bite-sized introduction considers how engineers provide practical and socially acceptable solutions in our world, showing how engineering is intimately part of who and what we are. Get your teeth into some science on your lunch break.

1pm (1 hour) • £5, **student offer £2.50** • Summerhall, Red Lecture Theatre

Presented by Oxford University Press

PART OF FOOD FOR THOUGHT

PART OF THE READING EXPERIMENT

PART OF MAKING IT... AT SUMMERHALL

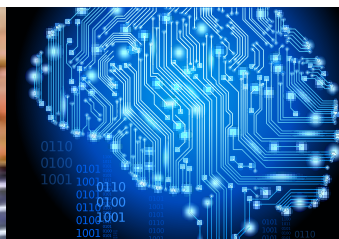


PROJECT WILD THING

Project Wild Thing is a movement to get children outside and reconnecting with nature, led by an ambitious, feature-length documentary that takes a funny and revealing look at a complex issue, the increasingly disparate connection between children and nature. Essential viewing for parents, teachers and everyone who cares about the future of our children, this special screening of the film will be followed by a discussion led by **Sue Palmer**, author of *Toxic Childhood*.

7pm (2 hours) • £6/£4 • Royal Botanic Garden, 20a Inverleith Row (offices entrance)

Presented by Royal Botanic Garden Edinburgh



ARTIFICIAL INTELLIGENCE — WHAT TO THINK?

Join specialists from across science, theology and science fiction writing as they explore artificial intelligence (AI). **Prof Steve Fuller**, of the University of Warwick, **Dr Gavin Merrifield** of the University of Glasgow and science fiction writer **Charles Stross** consider what AI means to their disciplines and ponder its implications for the way we understand the world. Hosted by **Donald J MacDonald**, clinical biochemist and Elder of the United Free Church of Scotland and facilitated by **Sue Rigby**, geologist, and Vice Principal of Learning and Teaching at The University of Edinburgh.

8pm (90 mins) • £8/£6, **student offer £4**
National Museum of Scotland, Auditorium

Presented by Action of Churches Together in Scotland (ACTS)

PART OF THE READING EXPERIMENT



SCIENCE CEILIDH

Bring your dancing shoes and thinking caps for a ceilidh like nothing you've ever experienced before! Join **Peter Lovatt** (aka Dr Dance), neuroscientist **Lewis Hou** and his special science ceilidh band for an evening full of your favourite dances, rejigged by the addition of a twist of science. Discover what's happening in your head whilst busting moves in the Canadian Brain Dance, simulate your immune system in the Dashing White Blood Cell, and replicate your DNA by swinging base-pairs in the Orcadian Strip-the-Helix. The science and steps behind each dance will be called throughout, so this tour-de-force of your body is bound to move you!

8pm (2.5 hours) • £10/£8 • Summerhall, Dissection Room



MAKING DATA WORK

Desktop 3D printers, laser cutters and open source instructions are making it easier than ever before for the public to create for themselves. This 'maker' movement has been heralded as the new Industrial Revolution, but what is all the fuss about? Just another commercial fad or tools for social good?

Join **Prof Jon Rogers** and **Dr Jayne Wallace** of the University of Dundee, **Paul Egglestone**, Director of the Media Innovation Studio at the University of Central Lancashire, and **Pete Thomas**, Futures Director at Uniform, a Liverpool-based design company to see what they make of it all.

8pm (90 mins) • £8/£6, **student offer £4**
Summerhall, Anatomy Lecture Theatre

PART OF MAKING IT... AT SUMMERHALL



A VERY SHORT INTRODUCTION TO...CLIMATE

Food for Thought lets you get your teeth into some science on your lunch break, this time serving up Professor of Geography at UCL, **Mark Maslin**.

Get your science fix this lunchtime with a bite-sized helping of easily digestible knowledge from Mark as he considers the global climate system, including the processes that allow energy to reach the Earth; the relationship and differences between climate and the weather; how climate has affected life on Earth and human settlements; and the issue of climate change and our approaches to tackling it.

1pm (1 hour) - £5, student offer £2.50 - Summerhall, Red Lecture Theatre

Presented by Oxford University Press



FASTER, HIGHER, STRONGER

Do science and sport really mix? Can the use of technology take place on a truly level playing field? In the year of the Commonwealth Games, this audience-based debate with rugby star **Scott Hastings**, Paralympian **Anne Wafula-Strike** and sports journalist **Graham Speirs** will explore the benefits, problems and ethical questions that arise from the use of technological advances in competitive sport.

5.30pm (90 mins) - £8/£6, student offer £4 - National Museum of Scotland, Auditorium

Presented by the Church of Scotland



BURPS OF DEATH?

Beneath the world's oceans and permafrost lurks a deadly threat, methane hydrates. Immense stores of frozen methane which if released could cause super global warming. Were there 'burps of death' in the past which changed global climate and caused extinctions?

Prof Mark Maslin of the Department of Geography at University College London takes a critical look at methane hydrates and their role in both past and future global change.

5.30pm (90 mins) - £8/£6, student offer £4 - Summerhall, Red Lecture Theatre

PART OF FOOD FOR THOUGHT

PART OF THE READING EXPERIMENT



MAKING SENSE OF ASTRONOMY

How can we improve communication of astronomy to the Deaf community? By creating better BSL for the science, that's how! A ground-breaking Scottish project has done just that, creating over 90 new signs; from signs for each of the planets, to signs for concepts such as black holes and red giants.

Join **Dr Audrey Cameron** of the Scottish Sensory Centre, **Gary Quinn** of Heriot-Watt University and **Tania Johnston** of the Royal Observatory Edinburgh to find out how the signs have been developed and see the signs in action through astronomy activities. This event will be BSL interpreted.

8pm (90 mins) - £8/£6, student offer £4 - National Museum of Scotland, Auditorium

Presented by the Royal Observatory Edinburgh



TECHNO-THREADS AND FUTURE FASHION

From embroidered circuits to 3D-printed jewellery, new technology is cropping up in our shoes, dresses and fashion accessories. Gaze down the runway at the future of fashion in this show and installation. Explore the world of interactive wearables and mingle with local and international designers to tunes from our live DJ. Designs will include multiple 3D-printed outfits by **Janne Kytönen** and **Annie Shaw**, Creative Directors of 3D Systems, the largest 3D printing company in the world, and creations from CuteCircuit's **Francesca Rosella**, high end fashion designer of choice for Katy Perry. **Lynsey Calder** will also showcase the latest in smart costumes developed at Heriot-Watt University.

8pm (2 hours) - £15 (includes drink on arrival) - Summerhall, Dissection Room

In association with New Media Scotland

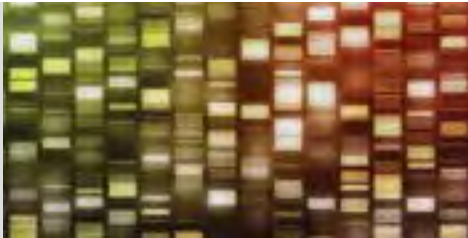
Supported by



WHEN SCIENCE AND THE MEDIA COLLIDE

Read all about it! The media shapes public attitudes to science, but what role should they play in reporting it? When does leading us through the research becoming misleading? And where does the responsibility lie when things go wrong? With examples from controversial topics such as fracking, researcher **Prof Joyce Tait** of the Innogen Institute, **Edward Sykes** from London's Science Media Centre and journalist **Peter Ranscombe** probe the reality and challenges of this crucial but sometimes fractious relationship.

8pm (90 mins) - £8/£6, student offer £4 - Summerhall, Red Lecture Theatre



DNA AND GENEALOGY – DOING IT PROPERLY!

Dr Bruce Durie is one of Scotland's best-known genealogists, who just happens to also have a background in molecular biology. Genealogy is a science, and DNA testing is an increasingly important technique, when combined with traditional document-based research. Bruce will explain the different types of DNA testing used in family history research, what information each test actually provides, and how not to fall into the trap of over-interpreting the results.

5.30pm (90 mins) • £8/£6, student offer £4 • Summerhall, Anatomy Lecture Theatre



THE SCIENCE IN YOUR SCIENCE FICTION: HOW TO GET IT RIGHT

The relationship between sci-fi and sci-fact is a complex affair. Works of science fiction have been accused of inaccuracy, scaremongering and damaging the public understanding of science. Conversely, these imagined worlds can also spark debate, challenge ignorance and engage new audiences. Join acclaimed sci-fi author Ken MacLeod for a special writing masterclass looking at how to get your facts right, from initial inspiration to conducting research and pulling it together on paper without derailing the story. The seminar ends with a writing challenge designed to put your new skills into practice.

6pm (2 hours) • £10/£8 • National Library of Scotland

Presented by the National Library of Scotland



LATELAB: PECHA KUCHA

Pecha Kucha Night was devised in Tokyo in February 2003 as an event for young designers to meet, network, and show their work in public. It has turned into a massive celebration, with events happening in hundreds of cities, inspiring creatives worldwide.

It is curated in Edinburgh by Gordon Duffy, Principal of architecture practice Studio DuB. Drawing its name from the Japanese term for the sound of 'chit chat', its presentation format is based on a simple but effective idea; 20 images x 20 seconds. You'll be surprised how much you can fit in.

LateLab is a collaboration between Edinburgh International Science Festival, New Media Scotland and The University of Edinburgh's School of Informatics.

7pm for 7.30pm (3 hours) • Free (ticket required) • Informatics Forum

PART OF THE READING EXPERIMENT

PART OF LATELAB

MAKING THINGS

Following the first fabulous *Edinburgh Mini Maker Faire* in 2013, this year's Festival promises a two-week celebration of maker culture, highlighting the ever-increasing popularity of accessible, hackable technologies and DIY science.

Making It... at the Museum, will take centre stage in the Grand Gallery of the National Museum of Scotland with a series of purpose-built interactive pods showcasing everything from 3D printing to open source architecture, electronics to DIY biology.

Inspired by this, budding inventors, makers and crafters should head straight to *Making It... at Summerhall*, for a series of hands-on workshops for the whole family. Led by expert makers from around the UK, these sessions will give you the chance to learn the basics of coding, make your own animation, programme an Arduino and design your own screen-printed t-shirt.



And just when you thought we couldn't make any more... the day-long extravaganza that is the *Edinburgh Mini Maker Faire* is back. Even bigger and shinier than before, we will once again close the Festival by filling Summerhall with novel gadgets and ingenious inventions and their inventors. With demonstrations, workshops, performances and exhibitions, visitors of all ages will find inspiration for creative projects and have the chance to try new activities and even take home the results. For details see makerfaireedinburgh.com

Making It... at the Museum is open daily throughout the Festival see page 12 for info. Full details of *Making It... at Summerhall* workshops are available on p22–23.



Making It... was developed with support from the Scottish Government's Edinburgh Festivals Expo Fund

Supported by





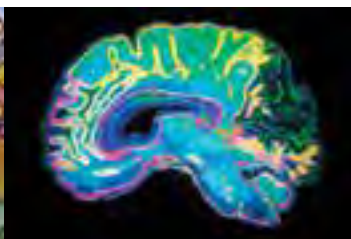
PHILOSOPHY IN THE PLAYGROUND: DOES TECHNOLOGY MAKE YOU SMARTER?

Technology not only helps us, it also changes us. Children now carry around sophisticated computers in their pockets. Does this change them for the better (make them smarter?) or worse?

Dr Mark Sprevak, Lecturer in Philosophy of Mind and Cognition at the School of Philosophy, Psychology and Language Sciences, University of Edinburgh, will guide our discovery of some of the surprising ways in which technology changes our children.

10:30am (1 hour) - Free (ticket required)
Summerhall, Old Lab

Presented by Summerhall



EXPLORING ALZHEIMER'S DISEASE

Healthy Lunches continues with an exploration of Alzheimer's disease, the most common form of dementia, and one for which there is as yet no cure. Little is known about its causes but we do know that Alzheimer's disease has far-reaching impacts on patients, their families and carers. **Dr Gayle Doherty** from the University of St Andrews gives an insight into recent research on the origins and ways to treat this disease while *Puppetry in Dementia Care* author **Karrie Marshall** explains her belief in the role of creativity in caring for people with dementia.

1pm (1 hour) - £5, student offer £2.50
National Museum of Scotland, Auditorium

PART OF HEALTHY LUNCHES



A VERY SHORT INTRODUCTION TO...PHYSICAL CHEMISTRY

Food for Thought lets you get your teeth into some science on your lunch break; this time tackling physical chemistry with respected popular science writer **Prof Peter Atkins** of the University of Oxford. In this insightful introduction to a branch of chemistry often perceived as daunting, Peter takes in physics, mathematics, quantum mechanics, thermodynamics and statistics, explaining in the process the cultural contributions physical chemistry has made to our understanding of the natural world.

1pm (1 hour) - £5, student offer £2.50
Summerhall, Red Lecture Theatre

Presented by Oxford University Press

PART OF THE READING EXPERIMENT

PART OF FOOD FOR THOUGHT



SPOTLIGHT ON: MINERALS AND MOBILE PHONES

Did you know that mobile phones contain a small amount of almost all the chemical elements?

Sourced from rare earth materials, their extraction and production has serious human and ecological impact. Join curator **Dr Rachel Walcott** and **Prof Simon Harley** from The University of Edinburgh to find out more.

2pm (1 hour) - Free (ticket required) - National Museum of Scotland, Learning Centre Level 4

Presented by the National Museum of Scotland



EXPERT WITNESS

Forensic medicine is without a doubt one of science's most fascinating subjects. Join **Prof Antony Busuttill**, Regius Professor of Forensic Medicine at The University of Edinburgh – and Forensic Medical Examiner best known to the public as the pathologist who dealt with the horrors of the Lockerbie bombing and the Dunblane Primary School shooting – as he talks about this and other aspects of his work.

6pm (75 mins) - Free (ticket required)
Surgeons Hall Museum

Presented by the Surgeons Hall Museum



LATELAB: A LOOK AT LAUGHTER

Are you game for a giggle? We often hear that laughter is the best medicine and indeed hearing or seeing someone else laughing fires up the areas of our brain related to imitation and get us ready to laugh too. Laughter is universal amongst humans and is even seen in chimpanzees and gorillas – but how much do you really know about it? We'll investigate why we laugh and hopefully give you plenty of chances to chuckle and chortle. *LateLab* is a collaboration between Edinburgh International Science Festival, New Media Scotland and The University of Edinburgh's School of Informatics.

7pm for 7.30 (3 hours) - £8/£6 - Informatics Forum

PART OF LATELAB



BOTANICS LATE: INDIGENOUS?

AGES 18+

Join scientists and artists for an exclusive evening event in the John Hope Gateway celebrating the connection between culture and nature both internationally and here in Scotland. The programme includes live music, exhibitions, hands-on making sessions, a licensed bar, and the chance to visit the Garden's contemporary art gallery Inverleith House.

7.30pm (2.5 hours) - £10/£8 - Royal Botanic Garden Edinburgh, John Hope Gateway

Presented by Royal Botanic Garden Edinburgh



RICHARD WISEMAN'S NIGHT SCHOOL

Prof Richard Wiseman is on a mission to put the world to sleep. For the past year he has explored the new science of sleep and dreaming, conducted experiments into sleep-learning, and assembled the world's largest archive of dream reports.

Join Richard as he uncovers the power of the sleeping mind, revealing how you can get the perfect night's sleep, decode your dreams, and improve your life without moving a muscle. This event will involve live EEG projection, a demonstration of mass suggestion, and several pairs of yellow glasses.

8pm (90 mins) - £8/£6, student offer £4
Summerhall, Dissection Room

PART OF THE READING EXPERIMENT



LAPONIA: NATURE AND NATIVES

AGES 18+

In the far North of Sweden, Laponia is one of the best preserved wilderness areas in Europe but also home to the Sami People. How are the interests of this traditional reindeer-herders and conservationists being managed? Find out more in a screening of this new documentary film, followed by a discussion chaired by anthropologist **Prof Tim Ingold**.

3pm (90 mins) - £6/£4 - Royal Botanic Garden, 20a Inverleith Row (offices entrance)

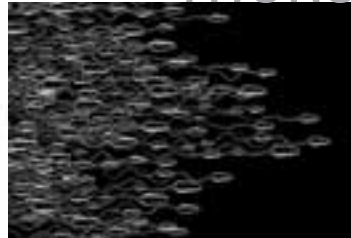
Presented by Royal Botanic Garden Edinburgh



BEHIND THE SCENES IN SCIENCE PUBLISHING

Join **Michael Rodgers**, editor of science writing classics including Richard Dawkins' *The Selfish Gene*, and author and academic **Prof Peter Atkins** for a glimpse behind the scenes of the world of science publishing. Discover the challenges of writing about science, the workings of the world of publishing and the process of collaboration between writer and editor that lies at the heart of a successful science book.

5.30pm (90 mins) - £8/£6, **student offer £4**
National Museum of Scotland, Auditorium



SPERM WARFARE

So you've found a healthy, fertile mate, you've fought off your rivals and you've convinced them that you are what they were looking for. Sorted! But the reproductive race is far from over, my friend. We have entered the realms of Sperm Warfare. Join biologist, writer, science communicator and TV presenter **Simon Watt** (*Inside Nature's Giants*) to learn about the devious tricks used by cells, organs and bodies to win the race to fertilisation.

5.30pm (1 hour) - £8/£6, **student offer £4**
Summerhall, Dissection Room



WHAT SCIENTISTS READ

What DO scientists read? And what role does literature play in contemporary scientific thought and practice? Drawing on results from the ongoing *What Scientists Read* project, acclaimed author **Alastair Reynolds** and BBC New Generation Thinker **Dr Sarah Dillon** will be joined by two of the project's interviewees to discuss scientists' reading habits. Submit your 'bookshelfies' in advance to info@whatscientistsread.com and join the discussion!

5.30pm (90 mins) - £8/£6, **student offer £4**
Summerhall, Red Lecture Theatre

Presented by the What Scientists Read research team, funded by the Royal Society of Edinburgh

PART OF THE READING EXPERIMENT

PART OF THE READING EXPERIMENT



THE MINOTAUR FORUM: A LAY-PERSON'S GUIDE TO GENETICALLY MODIFYING YOUR OWN MONSTROUS HYBRID

Imagine you wanted to create a monster. Today. Maybe tomorrow (need to plan first). What would be required? Have you completed the necessary risk assessments? Join leading scientists from the universities of Edinburgh and Reading working in the fields of cognitive science, evolutionary biology, and augmented intelligence for a fascinating insight into the limits of human thought and being, and an entertaining look at what would be required to be a 'modern day Frankenstein'.

8pm (90 mins) - £8/£6, **student offer £4** - Summerhall, Red Lecture Theatre

Part of *The Minotaur* performance project by Rupert Thomson, in association with Edinburgh International Science Festival



BETA-LIFE: SHORT STORIES FROM A-LIFE FUTURE

Artificial life (A-Life) is becoming increasingly important, not just to scientists, but to the wider global community. The growing challenges we face (energy, the environment, a changing demographic profile...) will require inherently inter-disciplinary strategies. A-Life and unconventional computing technologies will play an important role in addressing these issues. Comma Press in conjunction with TRUCE have coordinated a series of collaborations between scientists and literary authors to explore what A-Life and unconventional computing will mean to ordinary people in 2070. Join **Sarah Schofield**, **Robin Yassin-Kassab**, and **Prof Martyn Amos** to hear their thoughts.

8pm (90 mins) - £8/£6, **student offer £4** - Summerhall, Anatomy Lecture Theatre

Presented by Comma Press



THE PERFECT MIX?

With September's referendum drawing ever closer, there are some big questions to be asked about the future of Scotland's energy in the next of our *Scotland Decides* series. What is Scotland's perfect energy mix? Would independence help us to make the most of the nation's renewable know-how? Could the lights stay on in a nuclear-free Scotland, and will the economics add up? Broadcaster **Lesley Riddoch** is joined by **Dr David Toke**, Reader in Energy Politics at the University of Aberdeen; **Dr Paul Harding**, Executive Director of URENCO; **Marco Biagi MSP** (SNP) and other politicians and key thinkers for a vital debate on how Scotland plans to power its future.

8pm (90 mins) - £8/£6, **student offer £4** - National Museum of Scotland, Auditorium

In association with the National Museum of Scotland
Supported by



PART OF MAKING IT... AT SUMMERHALL

PART OF THE READING EXPERIMENT

PART OF SCOTLAND DECIDES



THE DARK SIDE OF THE UNIVERSE

Billions of years ago the Big Bang sent everything flying. In theory, gravity should stop galaxies from moving apart and matter should re-collapse on itself, but galaxies are actually moving apart with ever-increasing speed. Theorists are developing a solution: dark energy. Royal Society Research Fellow **Dr Clare Burrage** reveals the nature of this mysterious force to host **James Hough**, Research Professor in Natural Philosophy at the University of Glasgow.

5.30pm (90 mins) • £8/£6, student offer £4 • National Museum of Scotland, Auditorium

Presented by The Royal Society



MARCUS CHOWN'S TOP 10 BONKERS THINGS ABOUT THE WORLD

Popular science writer **Marcus Chown** was set a challenge: write about everything. So he did; in his book, *What A Wonderful World*.

Did you know you are 1/3 mushroom? That you could fit the human race in the volume of a sugar cube? That slime moulds have 13 sexes? Or that 98% of the Universe is invisible? Well now you know – find out more from Marcus as he shares some of the secrets of our wonderful but slightly bonkers world.

5.30pm (90 mins) • £8/£6, student offer £4 • Summerhall, Dissection Room



CONFLICTING OPINIONS?

Commemorating the centenary of the First World War, we explore the sometimes uneasy relationship between science and the defence industry. In a sadly unstable world, global security relies increasingly on technology. Although bound by complex codes and international law, research and engagement funding raises moral questions across our society, including for scientists. Have your say in this panel debate as we discuss who funds research, what motivates them to do it and the outcomes that funders, scientists and society seek.

5.30pm (90 mins) • £8/£6, student offer £4 • Summerhall, Cairns Lecture Theatre



CHOOSE YOUR SCOTLAND

Whatever the outcome, Scotland's independence referendum will have a significant impact on Scottish life science research and innovation. The final event in our *Scotland Decides* series is an interactive 'Choose Your Own Adventure' event that will let you choose your own Scotland. Starting from the referendum, the audience will select a series of options, by popular vote, that will affect science, innovation and our everyday lives.

5.30pm (90 mins) • £8/£6, student offer £4 • National Museum of Scotland, Auditorium

Presented by Innogen

In association with the National Museum of Scotland



LATELAB: CASINO SCIENZA

Roll up and roll the dice in our casino with a twist; joining the croupiers will be a crafty group of risk-taking researchers and experts in trickery. Investigate gambling's scientific secrets then have a go on the tables yourself. Does the house always win? What risks are you willing to take when the stakes are high? Learn the difference between the improbable and the impossible and use this knowledge to your advantage – tonight might be your lucky night!

LateLab is a collaboration between Edinburgh International Science Festival, New Media Scotland and The University of Edinburgh's School of Informatics.

7pm for 7.30pm (3 hours) • £8/£6 • Informatics Forum



COSMOLOGIES, FAITH AND THE ENVIRONMENTAL CRISIS

How do different cosmologies affect the way we treat the environment? Chair **Dr Jeremy Kidwell** of The University of Edinburgh leads speakers **Dr Fazlun Khalid** of the Islamic Foundation for Ecology and Environmental Studies and **Dr Mark Harris** of the School of Divinity at The University of Edinburgh in discussion with other guests as they examine how the cosmologies of the world's religions affect human behaviour, and what this means for evidence-based science. Then have your say as he opens the discussion up to the floor and asks what you think, believe and feel.

8pm (90 mins) • £8/£6, student offer £4 • National Museum of Scotland, Auditorium

Presented by Eco-Congregation Scotland



LATELAB: DIALOGUES

Dialogues emerged in 1999 to fill an aching gap in Edinburgh's music scene with performances by experimental musicians from Scotland, the UK and abroad. Come to *Dialogues* at *LateLab* to sample new music and sound design from this ongoing programme of concerts and workshops. *LateLab* is a collaboration between Edinburgh International Science Festival, New Media Scotland and The University of Edinburgh's School of Informatics.

7pm for 7.30pm (3 hours) • Free (ticket required) • Informatics Forum

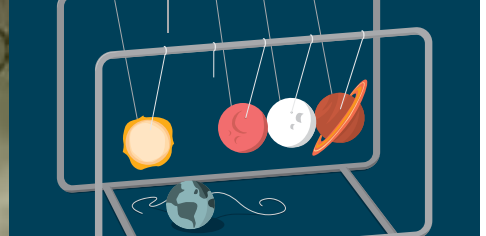


THE BLIGHT OF ERSATZ NEUROSCIENCE

The 'neuro' prefix is very fashionable nowadays. The growing interest in applying our knowledge of the human brain to different fields has resulted in the development of a number of new practices – some good, some bad, and some just crazy.

Join The University of Edinburgh's Prof Sergio Della Sala as he explains how some enthusiastic scientists have over-simplified the findings from neuroscience and over-interpreted the outcome, giving rise to a number of tall tales on how the brain works.

8pm (90 mins) • £8/£6, student offer £4 • National Museum of Scotland, Auditorium



WHERE WORLDS COLLIDE

AGES 18+

Join us for an eclectic evening of intriguing entertainment exploring what happens when the worlds of science and words collide, creating a unique atmosphere rich in poetry, literature, comedy and facts about dinosaurs*.

Electric Bookshop explores how technology influences publishing, a selection of other original thinkers help with our literary experiments and we host our own science-themed poetry slam.

*dinosaur facts not guaranteed.

8pm (2 hours) • £8/£6, student offer £4 • Summerhall, Dissection Room

PART OF LATELAB

PART OF THE READING EXPERIMENT



EDINBURGH MINI MAKER FAIRE

ALL AGES

After winning the Creative Edinburgh Unite Award in 2013 for bringing creative people together, the *Edinburgh Mini Maker Faire* is back – this time bigger, shinier and with more knobs on! Filled with novel gadgets, ingenious inventions, demonstrations, performances and interactive workshops, the Faire lets Scotland's makers take centre stage in a family-friendly showcase of resourcefulness and creativity. Hear from local innovators, ride a pedal-powered car and try a Raspberry Pi. Come along and 'make' a day of it!

10am–5pm • £3 (under 3s free) • Summerhall



LATELAB: GASTROLAB • OPEN SAUCES

Food, culture and the environment have an intricate relationship that extends back to the origin of humans as a social species. To survive, we eat; to eat, we feed the environment that feeds us – food is a product of the reciprocal connection to our ecological habitats. FoAM look at food from a holistic and systemic perspective. Too often however we eat in haste, forgetting to truly taste food. Tonight we'll focus our minds on the taste of food, with its visual, sonic, olfactory and tactile properties that can energise and invigorate.

LateLab is a collaboration between Edinburgh International Science Festival, New Media Scotland and The University of Edinburgh's School of Informatics.

7pm for 7.30pm (3 hours) • £10/£8 • Informatics Forum

Edinburgh Mini Maker Faire is independently organised and operated under license from Maker Media, Inc.

Make:
makezine.com

PART OF GASTROFEST

EDINBURGH INTERNATIONAL SCIENCE FESTIVAL

Edinburgh International Science Festival is a high profile and dynamic educational charity. Each year it delivers one of Europe's largest Science Festivals; a primary school education programme which tours across Scotland and a variety of international projects including its role as Major Programme Partner for the Abu Dhabi Science Festival. Charity Number: SC003790 Registered Office: Suite 1, Mitchell House, 5 Mitchell Street, Edinburgh EH6 7BD

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We would like to thank Generation Science Club members for their support of Edinburgh International Science Festival's schools touring programme. Generation Science Club is a network of individuals and companies dedicated to engaging the next generation in science and technology. Members of the club donate funds to help ensure our school shows and workshops can be enjoyed by all pupils – wherever they are and whatever their financial background. With particular thanks to:

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EDINBURGH FESTIVALS

Edinburgh is the world's Festival City. Visit edinburghfestivals.co.uk for news, listings and insider information across Edinburgh's year round festival programme.

Imaginate Festival

5–12 May 2014 imagine.org.uk

Edinburgh International Film Festival

18–29 June 2014 edfilmfest.org.uk

Edinburgh Jazz and Blues Festival

18–27 July 2014
edinburghjazzfestival.com

Edinburgh Art Festival

31 July–31 August 2014
edinburghartfestival.com

Edinburgh Festival Fringe

1–25 August 2014 edfringe.com

Royal Edinburgh Military Tattoo

1–23 August 2014 edintattoo.co.uk



Edinburgh International Festival

8–31 August 2014 eif.co.uk

Edinburgh International Book Festival

9–25 August 2014 edbookfest.co.uk

Edinburgh Mela

29–31 August 2014 edinburgh-mela.co.uk

Scottish International Storytelling Festival

24 October–2 November 2014
scottishstorytellingcentre.co.uk

Edinburgh's Hogmanay

30 December 2014–1 January 2015
edinburghshogmanay.com

Edinburgh International Science Festival

4–19 April 2015 sciencefestival.co.uk

GETTING HERE

Many of our venues in the city centre are easily accessible on foot or by public transport. Please consider using public transport when visiting our events. As an incentive, if you present your ticket or travel card at the City Art Centre you'll receive a free gift!

LET'S GO GREENER TOGETHER.
GREENERSOTLAND.ORG



PUBLIC TRANSPORT

Buses lothianbuses.com, trains scotrail.co.uk, car sharing gocarshare.com, cyclists journey planner edinburgh.cyclestreets.net



BY BUS

We've teamed up with Lothian Buses to offer information about travel to all of our venues. See the venue map on the back page of this programme for bus listings to each of our venues. Please visit lothianbuses.com or call 0131 555 6363 for further information.



BY TRAIN

For train travel in Scotland and tickets, visit scotrail.co.uk. For National Rail enquiries, see nationalrail.co.uk or call 08457 48 49 50.

BY CAR

There are multi-storey car parks and metered parking around the city centre. Keep in mind that many of our venues are easily accessible on foot or by public transport. Please consider the environment when planning your travel to and from our events.

TOURIST INFORMATION

Further information on Edinburgh and the surrounding area, along with accommodation listings and online booking, is available at visitscotland.com

ACCESSIBILITY

If you would like a copy of the brochure in a different format please contact: marketing@scifest.co.uk or call 0131 553 0320 (please note that we may require additional time to produce these materials).

Access information for each of our venues is available on the venue section of our website. If you have special access requirements or need to book wheelchair spaces please call our box office on 0844 557 2686.

Family DAYticket

2 ADULTS ^{UP TO} 3 CHILDREN*



All-day travel on our day services for £7.50

Use your Family DAYticket to travel to the **Science Festival!**

Buy online, on bus, or with your phone using the official Lothian Buses app.

One ticket,
one big day out



*5-15 years old. Standard terms and conditions apply across all age groups.

Transport for Edinburgh



SCIENCE FESTIVAL VENUES 2014



- 1** Banshee Labyrinth (29-35 Niddry Street, Edinburgh, EH1 1LG) Bus: 3, 5, 7, 8, 14, 29, 30, 31, 33, 35, 37, 45, 49
- 2** Central Library (7-9 George IV Bridge, Edinburgh, EH1 1EG) Bus: 2, 23, 27, 35, 41, 42, 45, 47, 67
- 3** The Centre, Livingston (Almondvale Boulevard, Livingston, EH54 6HR) Bus: First Bus Service 21, 22, 27, 28
- 4** City Art Centre (2 Market Street, Edinburgh, EH1 1DE) Bus: 36, 100
- 5** City Chambers (253 High St, Edinburgh, EH1 1YJ) Bus: 3, 5, 7, 8, 14, 23, 27, 29, 30, 31, 33, 35, 37, 41, 42, 45, 49, 67
- 6** Edinburgh Castle (Castlehill, Edinburgh, EH1 2NG) Bus: 23, 27, 41, 42, 67
- 7** Edinburgh Zoo (134 Corstorphine Road, Edinburgh, EH12 6TS) Bus: 12, 26, 31, 100
- 8** Filmhouse (88 Lothian Road, Edinburgh, EH3 9BZ) Bus: 1, 2, 10, 11, 15, 16, 24, 34, 47
- 9** George Square Theatre (30 George Square, Edinburgh, EH8 9LJ) Bus: 41, 42, 67
- 10** Gorgie City Farm (51 Gorgie Rd, Edinburgh, EH11 2LA) Bus: 1, 2, 3, 25, 33
- 11** Informatics Forum (10 Crichton St, Edinburgh, EH8 9AB) Bus: 41, 42, 67
- 12** The Mound Precinct (Edinburgh, EH2 2EL) Bus: 1, 3, 4, 10, 11, 12, 15, 16, 19, 22, 23, 25, 26, 27, 29, 30, 31, 33, 34, 36, 37, 41, 42, 44, 67, 113
- 13** National Library of Scotland (George IV Bridge, Edinburgh, EH1 1EW) Bus: 2, 23, 27, 35, 41, 42, 45, 47, 67
- 14** National Museum of Flight (East Fortune Airfield, East Lothian, EH39 5LF) Bus: Don Prentice Service 121
- 15** National Museum of Scotland (Chambers Street, Edinburgh, EH1 1JF) Bus: 2, 23, 27, 35, 41, 42, 45, 47, 67
- 16** Our Dynamic Earth (112-116 Holyrood Road, Edinburgh, EH8 8AS) Bus: 35, 36
- 17** Playfair Library (Old College, University of Edinburgh, South Bridge, EH8 9YL) Bus: 3, 5, 7, 8, 14, 29, 30, 31, 33, 35, 37, 45, 49
- 18** The Queen's Hall (85-89 Clerk St, Edinburgh, EH8 9JG) Bus: 2, 3, 5, 7, 8, 29, 30, 31, 33, 37, 47, 49
- 19** Riddle's Court (32 Lawnmarket, EH1 2PG) Bus: 23, 27, 41, 42, 67
- 20** Royal Botanic Garden Edinburgh (Inverleith Row, Edinburgh, EH3 5LR) Bus: 8, 23, 27
- 21** Scottish Seabird Centre (The Harbour, North Berwick, EH39 4SS) Bus: First Bus Service 124, X24
- 22** Scottish Storytelling Centre (43-45 High Street, Edinburgh, EH1 1SR) Bus: 35
- 23** St Andrews Square (Edinburgh, EH2 2BD) Bus: 1, 3, 4, 10, 11, 12, 15, 16, 19, 22, 25, 26, 29, 30, 31, 33, 34, 37, 44
- 24** St Giles Cathedral (High Street, Edinburgh, EH1 1RE) Bus: 3, 5, 7, 8, 14, 23, 27, 29, 30, 31, 33, 35, 37, 41, 42, 45, 49, 67
- 25** Summerhall (1 Summerhall, Edinburgh, EH9 1PL) Bus: 41, 42, 67
- 26** Surgeons Hall Museum (Nicolson Street, Edinburgh, EH8 9DW) Bus: 2, 3, 5, 7, 8, 14, 29, 30, 31, 33, 37, 41, 42, 47, 49, 67
- 27** Talbot Rice Gallery (The University of Edinburgh, Old College, South Bridge, Edinburgh, EH8 9YL) Bus: 3, 5, 7, 8, 14, 29, 30, 31, 33, 35, 37, 45, 49
- 28** University of Edinburgh, Centre for Research Collections (30 George Sq, Edinburgh, EH8 9LJ) Bus: 1, 3, 4, 10, 11, 12, 15, 16, 19, 22, 23, 24, 25, 26, 27, 29, 30, 31, 33, 34, 36, 37, 41, 42, 44, 67, 113
- 29** University of Edinburgh, Visitors Centre (2 Charles St, Edinburgh, EH9 3JG) Bus: 2, 23, 27, 41, 42, 47, 67
- 30** University of Edinburgh, FloWave TT All-Waters Marine Test Facility (West Mains Road, Edinburgh, EH9 3JG) Bus: 24, 38, 41, 42, 67