

EDINBURGH INTERNATIONAL



EDINBURGH INTERNATIONAL

# SCIENCE FESTIVAL

26 MARCH—10 APRIL 2016



BUILDING  
BETTER WORLDS

ONLINE BOOKING: [sciencefestival.co.uk](http://sciencefestival.co.uk)

BOOKING HOTLINE: 0844 557 2686

# EDINBURGH INTERNATIONAL SCIENCE FESTIVAL SUPPORTERS

## PRINCIPAL FUNDING PARTNERS

 <p>THE CITY OF EDINBURGH COUNCIL</p>		 <p>RIAGHALTAS NA H-ALBA</p>
--	---	---

## MAJOR FUNDING PARTNERS

 <p>Investment managers</p>	 <p>Promoting excellence in psychology</p>	
--	---	---

	 <p>Scottish Government</p>		 <p>COMMITTED TO BETTER ENERGY</p>
---	--	--	---

## FUNDING PARTNERS

	 <p>The Alwaleed Centre</p>			 <p>Hebridean &amp; Clyde Ferries</p>
				
				 <p>Intellectual Property Services</p>
				 <p>Leading Energy Discussion &amp; Debate</p>
 <p>Scottish Environment Protection Agency</p>				

## ENGAGEMENT PARTNER      MEDIA PARTNER      NEWS PARTNERS      TRANSPORT PARTNER

 <p>CARE. CONNECT. CAMPAIGN.</p>				
---	---	---	--	---

## VENUE AND PROGRAMMING PARTNERS

			 <p>BRINGING CONSERVATION TO LIFE</p>		
---	---	---	---	---	---

The annual Edinburgh International Science Festival is produced 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 & FOUNDATIONS

The Binks Trust  
Clara E Burgess Charity  
Cruden Foundation  
Dr Guthrie's Association  
The Equitable Charitable Trust  
Forteviot Charitable Trust  
The Gannochy Trust  
IET (The Institution of Engineering and Technology)  
Institute of Physics in Scotland  
James Clerk Maxwell Foundation  
Len Thompson Charitable Trust  
The Nancie Massey Charitable Trust  
Royal Society of Chemistry  
The Russell Trust

### WITH THANKS

Apache  
Arnold Clark Car & Van Rental  
Viridor

### EDINBURGH INTERNATIONAL SCIENCE FESTIVAL



### GENERATION SCIENCE CLUB

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:

### MEMBERS

Alex and Rhona Callander  
Edina Trust  
Joe Faraday  
John Hylands  
Nimar Charitable Trust  
Ian Ritchie  
Barry and Helen Sealey – The BEST Trust  
Scottish Qualifications Authority  
Toshiba Medical Visualization Systems Europe, Ltd  
The University of Edinburgh  
Ian Wall

### HONORARY MEMBERS

Prof Anne Glover  
David Sibbald  
Prof Lord Robert Winston

If you would like to become a Generation Science Club member, please contact [development@scifest.co.uk](mailto:development@scifest.co.uk)

For Science Festival 2016 we'll be exploring science, technology, engineering and design's ability to help improve our world and our lives through the concept of *Building Better Worlds*.

Join us over two weeks as we celebrate the ideas, innovations and creative visions colliding at the Festival and transforming the galleries, theatres and gardens of Edinburgh into launchpads to these better worlds.

## WHAT'S ON

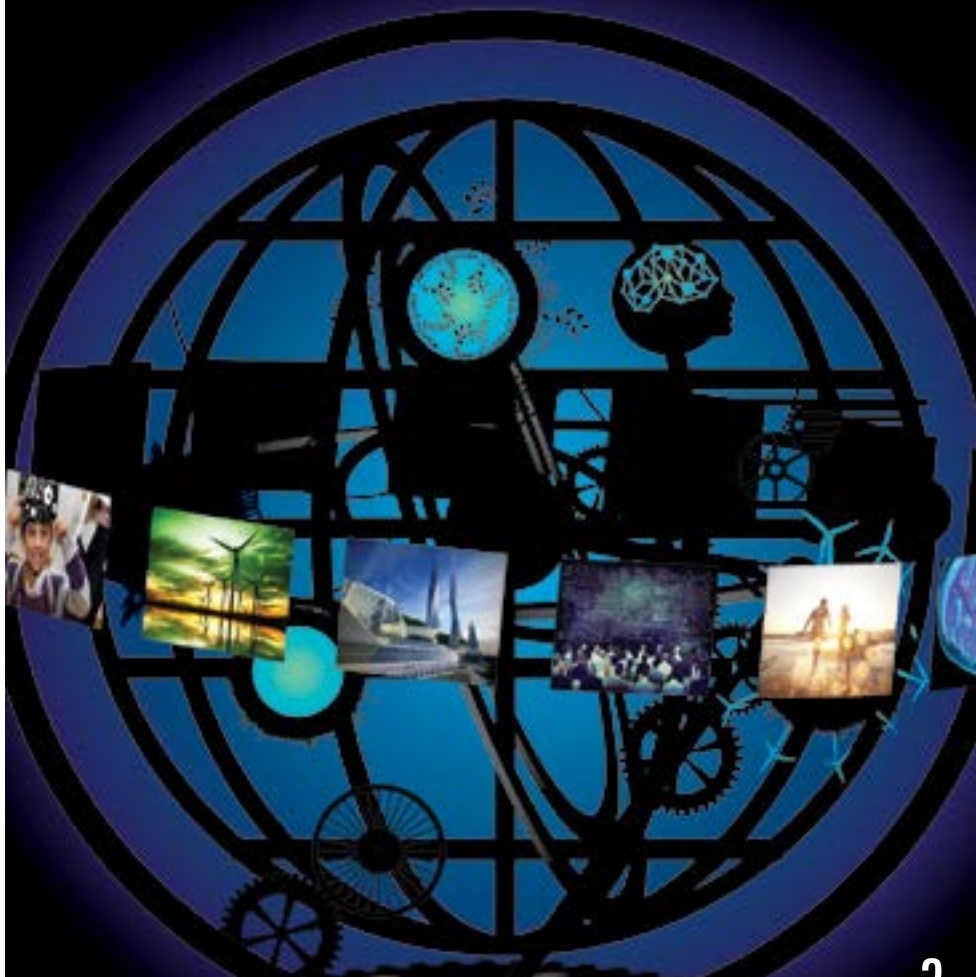
### FOR FAMILIES (P6–33)

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 transforms into a science hub with 6 floors packed full of the unique, immersive workshop experiences that the Science Festival is famous for, while Summerhall's stages are bursting with some of the best science performers from around the world and technical workshops for older children and teens.

Our programme of events and days out suitable for families are listed by venue. Don't miss our partner events at National Museum of Scotland, Royal Botanic Garden Edinburgh, RZSS Edinburgh Zoo and Dynamic Earth. 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.

### FOR ADULTS – AGES 14+ (P.35–61)

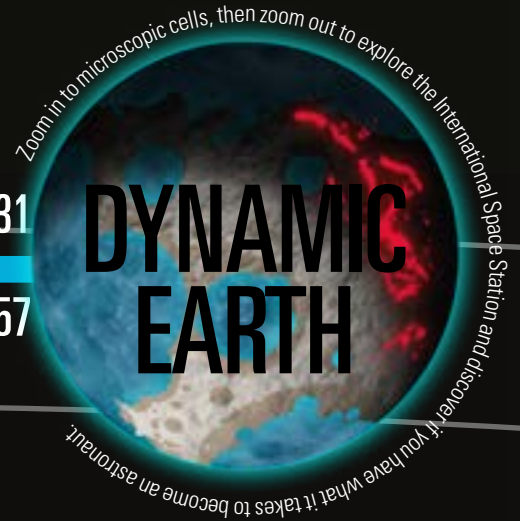
Our programme of adult events includes discussions, debates, workshops, screenings and nights out – all with a scientific twist. Our main venues are Summerhall, The Queen's Hall and the National Museum of Scotland. Don't miss *GastroFest* and check out the author led events of the *Reading Experiment* – we've got more information on all our programme strands on p.34 and you can search events by strand on our website: [sciencefestival.co.uk](http://sciencefestival.co.uk). The adult events programme is designed for visitors aged 14+. This is a recommendation only and younger audiences are very welcome. Adult events are listed by date with repeating events popping up as vertical cross references throughout the brochure. For full details see the introduction to the adult programme on p.34.



# EXPLORE OUR WORLDS

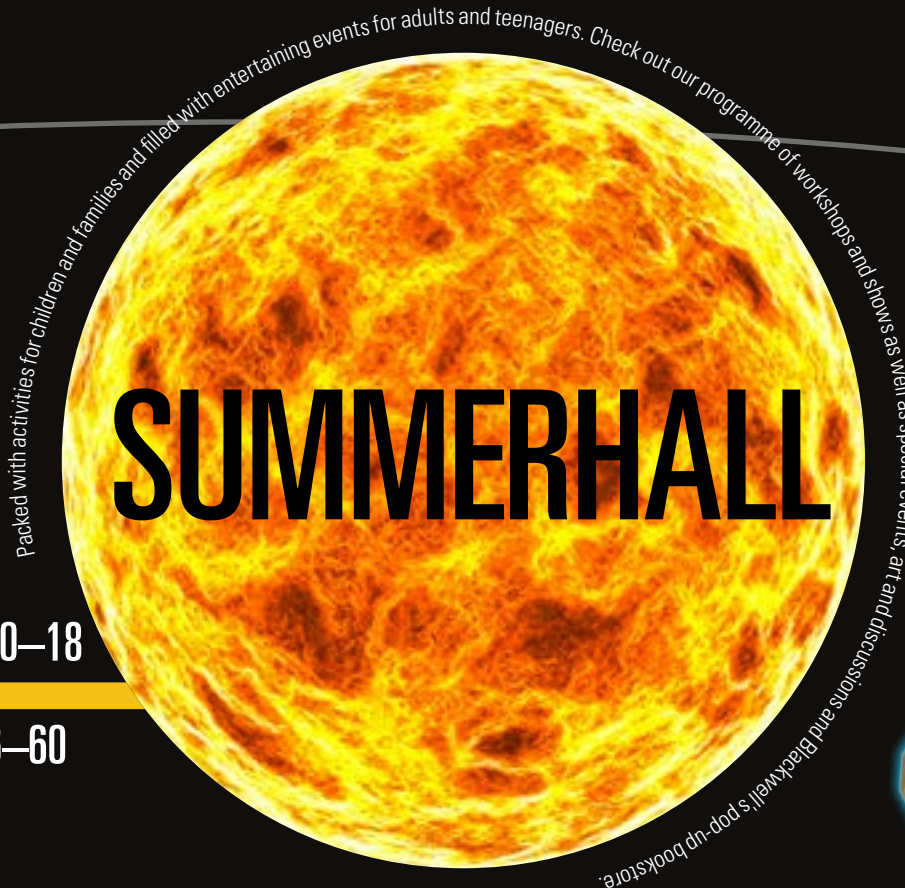
FAMILY EVENTS: PAGE 30–31

ADULT EVENT: PAGE 57



## 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, the festival is*



FAMILY EVENTS: PAGE 10–18

ADULT EVENT: PAGES 36–60

FAMILY EVENTS: PAGE 6–9

ADULT EVENT: PAGE 36





# RZSS EDINBURGH ZOO

FAMILY EVENTS: PAGE 28—29, 33

ADULT EVENTS: PAGE 41, 46



# ROYAL BOTANIC GARDENS EDINBURGH

FAMILY EVENTS: PAGE 26—27

ADULT EVENTS: PAGE 35—61



# NATIONAL MUSEUM SCOTLAND

FAMILY EVENTS: PAGE 20—25

ADULT EVENTS: PAGE 50—61



## CITY ART CENTRE

During the Science Festival, we transform Edinburgh's City Art Centre into a science playground packed full of workshops, shows and interactive events. Adults can join in too – don't miss our opening party *Science Festival Lates* (p.36).

# CITY ART CENTRE



**OPEN DAILY SATURDAY 26 MARCH—SATURDAY 9 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.

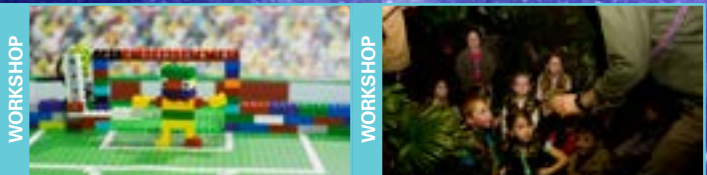
## HOW TO BOOK

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. When you're ready to book your tickets you can add a selection of bookable activities to eligible child day passes. Drop-in activities don't need to be reserved and can be enjoyed by all the family throughout the day.

Please note, when attending City Art Centre children must be accompanied by an adult and unfortunately we do not issue tickets to lone adults (but if you want to get in on the fun, join us for *Science Festival Lates* (p. 36). If you would like to discuss large group bookings for City Art Centre please call our Box Office on 0844 557 2686 and they will be happy to help you plan your visit.

## VENUE SPONSOR

Every day, hundreds of millions of consumers worldwide rely on Cirrus Logic audio and voice technology at home, in their car and on their mobile devices. From our headquarters in Austin, Texas, and major facilities in Edinburgh and Newbury in the UK, Cirrus Logic connects us with the world around us to deliver a great audio experience. Make your voice heard — through Cirrus Logic technology.  
[cirrus.com](http://cirrus.com)



WORKSHOP

WORKSHOP

AGES 5+

### BRICKS AND BLOCKS

Join the robot sports training camp where our coaches will put you through your paces. You'll learn about robots and coding as you use a LEGO® WeDo kit to build your own goalkeeper and program it to play. Then it's time to test everyone's skills in the *Robot World Cup* penalty shoot-out. How many attempts can your goalkeeper save?

10am—4pm (hourly) | 45 mins

AGES 5+

### 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.

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

10am—4pm (half-hourly) | 45 mins

Supported by



Proud sponsor of Edinburgh International Science Festival





WORKSHOP



ACTIVITY

AGES 3+

**LITTLE GIANTS**  
Buzzy, the giant honeybee, leads you into the wonderful world of bees in this highly interactive show. Learn how a bee's body is different from ours and find out how bees and flowers work together. Then join our Bee Keeper on a magical mystery tour of a beehive and follow Buzzy on a trip to giant flowers, make pollen trail patterns and suck up nectar, just like a bee.

AGES 3+

**WEE WONDER WORLD**  
Have fun learning about science as you journey through our special space for smaller scientists. Explore why things float, listen to some classic stories with a scientific twist, construct a marvellous tower, build your own spinning toy or create a musical instrument.

10am–4pm (half hourly) | 20 mins

drop-in

CITY ART CENTRE



WORKSHOP

AGES 5+

**LITTLE SPARKS**  
Get stuck into circuits and discover what electricity does, as you work through challenges to create an electric-powered device. We'll start things off simply by making an easy electro-dough circuit, move on to the next level using your skills and knowledge to build an electrical device.



ACTIVITY

AGES 5+

**PHOTOLAB**  
Create and develop your own unique 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 darkroom. Chemistry has never been so cool.



WORKSHOP

AGES 5+

**SECRET LIFE OF CORAL**  
Find out what's lurking underwater as you explore the *Secret Life of Coral*. Do you know about the incredible animals and plants in a coral reef? Discover the amazing creatures that live in its communities and help us build a coral reef by making your own sea creature in this captivating hands-on space.



WORKSHOP

AGES 5+

**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

drop-in

drop-in

10am–4pm (hourly) | 45 mins

Supported by



WORKSHOP

AGES 7+

**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

Supported by



WORKSHOP

AGES 7+

**MINI MECHANICS**

Take a closer look at what makes an engine tick and use real tools to take one apart. Discover what parts are required to make a car move while exploring our full sized engine model. Then stand back as we create a fire piston explosion and demonstrate how power is created through combustion.

10am–4pm (hourly) | 45 mins

WORKSHOP

AGES 7+

**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

WORKSHOP

AGES 8+

**ER SURGERY**

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. Discover the secrets of surgery as you operate on the knee, abdomen and brain. Please note: this workshop is closed with no viewing area for parents.

10am–4pm (hourly) | 45 mins

Supported by the Cruden Foundation



## TICKET AND VENUE INFO

**CITY ART CENTRE OPENING HOURS**

Saturday 26 March–Saturday 9 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	£8
Child aged 7+	£9.50
Child aged 3–6	£7
Child under 3	FREE
Disabled	£5
Registered unemployed	£5

(for each family member up to 6 people. ID required)

## EARLY BIRD BOOKING

Book over the phone or in person before 29 February and get £1 off all Day Passes on Saturday 26, Monday 27 and Tuesday 28 March. Children must be accompanied by an adult.

ACTIVITY

ALL AGES

**HIDE AND SEEK WITH INDI**

Indi, our friendly IndigoVision monster, has lost her camera and she needs your help to find it! Using IndigoVision's video surveillance technology, you'll find Indi's monster friends and help her feel safe again. Each friend holds a clue to help you find where Indi has left her camera... Can you solve the clues and find the camera?

drop-in

Supported by



EXHIBITION

ALL AGES

**INTERNATIONAL IMAGES FOR SCIENCE**

The Royal Photographic Society brings its exciting new exhibition to the Science Festival. Supported by Siemens as part of the Curiosity Project, the exhibition includes 60 images of everything from galaxies and blood cells to popping soap bubbles and a mouldy strawberry. Follow the trail and find the key photos for your chance to win a Nikon camera!

drop-in

Supported by



image: Stephen Gschmeissner

ACTIVITY

ALL AGES

**SCIENCE FESTIVAL SHOWCASE**

Drop by our ever-changing Science Festival showcase for a taste of what else the Festival has to offer. This is your chance to get hands on with the rest of the Festival – don't miss it!

drop-in

FILM

ALL AGES

**SCIENCE MINI CINEMA**

In *Science Mini Cinema* you can see how scientists and engineers have used technology and design to create new inventions, tackle global challenges and improve our daily lives. From growing food in space to making a sandwich using an incredible prosthetic hand, and there are even science demonstrations that you can do at home!

drop-in

Supported by





WORKSHOP

AGES 8+

### GADGET FACTORY

Investigate and explore how everyday gadgets work and build your own in our mini *Gadget Factory*. After you've grasped the basics of creating an electrical circuit, pick your kit and use your skills to assemble your very own working electronic gadget. Once you've learned the secrets of soldering there's no end to the stuff you can make!

10am-4pm (hourly) | 45 mins

Supported by



ACTIVITY

ALL AGES

### CARNIVAL OF THE MIND

Roll up, roll up and step inside the *Carnival of the Mind* to discover the secrets of your brain! Visit our fortune teller to explore the function of your frontal lobe, take a turn on the high striker to uncover how you process pain and learn about vision at our coconut shy. It's all the fun of the fair but with added science!

drop-in

Supported by



The British Psychological Society  
Promoting excellence in psychology

SHOW

ALL AGES

### 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

WORKSHOP

ALL AGES

### COSY COSY GAME SHOW

A game show for parents and children where 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

### 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 bookable workshops per child's Day Pass purchase. Please use the schedule below 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 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 (£7.20), child aged 7+ (£8.65), child aged 3-6 (£6.36).

giftaid it

## BOOKABLE WORKSHOP SCHEDULE

AGE	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+	LITTLE GIANTS 20min	█	█	█	█	█	█	█	█	█	█	█	█	█	█
	SPLAT-TASTIC 45min														
5+	*JUNGLE SAFARI 45min														
	BRICKS AND BLOCKS 45min														
	LITTLE SPARKS 45min														
7+	PONGY POTIONS 45min														
	MINI MECHANICS 45min														
8+	*ER 45min														
	GADGET FACTORY 45min														

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

# SCIENCE IN THE SPOTLIGHT

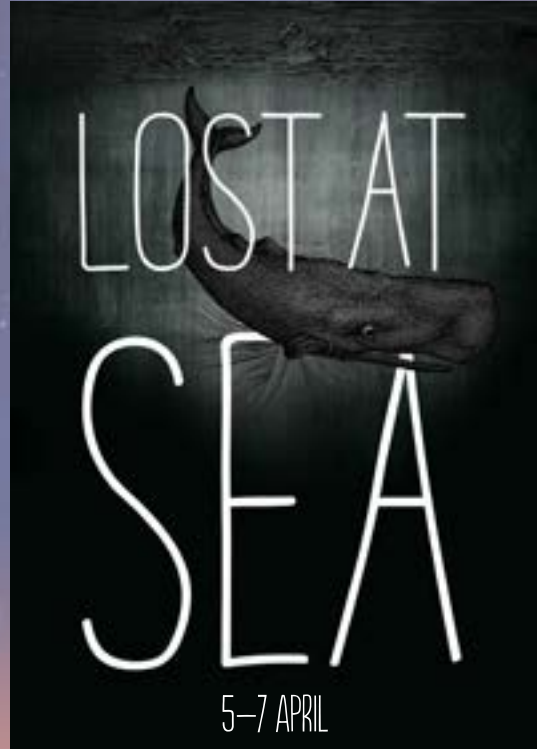
*Science in the Spotlight* is an ambitious new project by Edinburgh International Science Festival, working in partnership with Imagineate, which aims to bring together the wonder of theatre and the explosive world of science communication.

The project has produced two world class pieces of theatre for families that take a fresh approach to science as a part of the action; Catherine Wheels Theatre Company's *Lost at Sea* and *Uncanny Valley* from Borderline Theatre Company and The Gaiety Theatre, Ayr.

SUMMERHALL



An interactive show for 8–12 year olds, *Uncanny Valley* asks you, the audience, to interact with a real 'live' robot and help a futuristic science teacher tell the story of Ada and her best friend OKAY (Outstandingly Knowledgeable Android Youth). OKAY is under threat of being terminated and the only way to stop this is to prove he or she is exactly the same as you or me. Watch as OKAY grows and learns, join in by asking your own questions and try to decide whether you think OKAY is simply electrical impulses or ... Something more. Something almost human. Written by Rob Drummond and presented by **Borderline Theatre**.



Award winning theatre company **Catherine Wheels** find themselves *Lost at Sea* as they explore the biggest subject they could possibly try and tackle – the ocean. The journey begins with a boy and a girl, fascinated by the story of 28,800 bath toys that accidentally ended up flung into the unrelenting currents of the Pacific Ocean. Their investigation sees them uncovering the mysteries of the sea and discovering its importance to every one of us on Earth. *Lost at Sea* is an inquisitive and dynamic show offering an immersive experience for young audiences aged 8+.

Science in the Spotlight was developed with support from the Scottish Government's Edinburgh Festivals Expo Fund



**The Scottish Government**  
Riaghaltas na h-Alba

Science in the Spotlight working in partnership with



# SUMMERHALL

Summerhall is back as Edinburgh International Science Festival's hub for 2016. During the day, it will be packed with activities for children and families and in the evening it will be filled with entertaining events for adults and teenagers.

You'll find sensational science shows offering a world of new experiences for all ages along with interactive workshops for young people and adults that are full of scientific and creative challenges, from building a ray gun to making a monster.

Listings of events for children and families are included in the following pages and full details of events for adults can be found in the adult events section, p.35–61.

Blackwell's pop-up bookshop will be open every day in the courtyard chalet.

## VENUE SPONSOR

Baillie Gifford is delighted to support the Science Festival's hub, 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.

[bailliegifford.com](http://bailliegifford.com)



Investment managers






26 MARCH

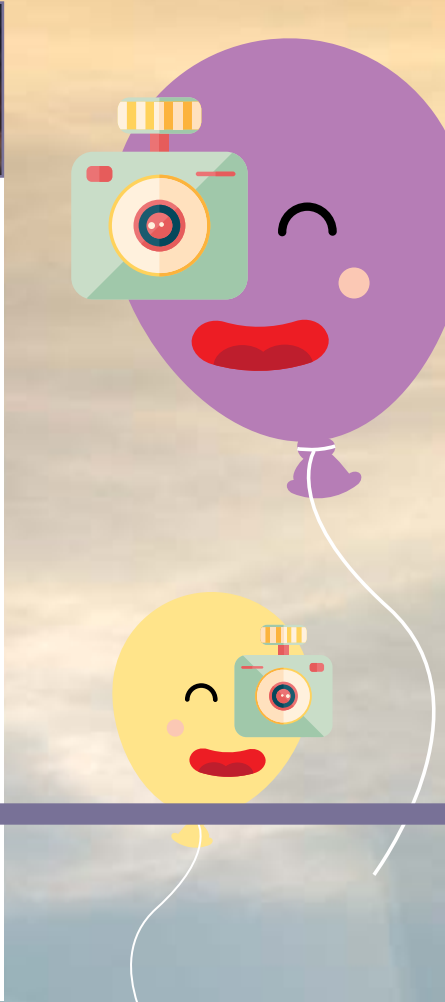
Join us for a day of prehistoric fun family activities. Make your own pair of dino-feet, enjoy some dino stories in our raptor nest, compete in an exciting egg hunt and discover dino fossils. There's even face painting and exciting excavations to boot!





SATURDAY 26 MARCH

10am–4pm | drop-in  
£3.50, under 5s free

WORKSHOP		WORKSHOP		SHOW	
AGES 5+	<p><b>DINO STARS</b> An interactive, hands-on workshop with some of Dinostar's fascinating collection of dinosaur exhibits. You'll get an opportunity to hear about dinosaurs including Triceratops and Tyrannosaurus rex and then study replica and genuine dinosaur fossils at close quarters. The workshop features dinosaur teeth, claws, bones, and even dinosaur eggs! <b>Steve Plater</b>, owner of the Dinostar dinosaur museum based in Hull, will be your guide in this hands-on dinosaur experience. Ticket includes entry to <i>Dino Day</i> activities.</p>	AGES 8+	<p><b>PAPER CIRCUITS</b> Learn the basics of electronics as you build circuits using only paper, scissors and copper tape. You'll also have the opportunity to use your new skills to create a great-looking light-up card with LEDs.</p>	AGES 8+	<p><b>MURDEROUS MATHS WITH KJARTAN POSKITT</b> Author of the <i>Murderous Maths</i> books Kjartan Poskitt introduces you to the people who really did put the murder into maths! He'll also be showing off some amazing tricks and weird facts including how to make a dragon from a cinema ticket... But no nasty sums, guaranteed! <i>'A stand-up maths routine has children and teachers in fits of laughter...'</i> The Times Educational Supplement</p>
<p>10am–3pm (hourly, not 1pm)   45 mins £4   Basement Gallery 4 Presented by Dinostar</p>		<p>11am   90 mins also on Saturday 9 April £10   Hacklab Presented by Edinburgh Hacklab</p>		<p>12.30pm and 2.30pm   1 hour £6, family ticket £20 (4 tickets) Dissection Room Presented by Scholastic Publishing</p>	

 <p>SHOW</p>	 <p>SHOW</p>	 <p>WORKSHOP</p>
<p><b>AGES 10+</b></p> <p><b>ZOMBIE SCIENCE: BRAIN OF THE DEAD</b></p> <p>This spoof lecture from the Zombie Institute for Theoretical Studies lifts the lid on the zombie skull and peers into the brain of the infamous movie monster. Join an expert Zombiologist to learn about the science of zombies, including which parts of the brain a zombie disease would have to attack to produce the classic symptoms. You might also be invited to defend against an attacking zombie, remove zombie ticks from a patient's arm or try out goggles that let you see in zombie vision. Supported by the Wellcome Trust and University of Glasgow.</p>	<p><b>AGES 6+</b></p> <p><b>PLANETS COLLIDE!</b></p> <p>It's 1616 and there is one burning question: where is the centre of the universe? Is it planet Earth, or is it the Sun? The topic is hot. So hot that the wrong answer might get you burned alive! Come and celebrate the 400th anniversary of the 'Rumble in Rome' with <b>Dan Green</b>, author of <i>Rebel Science</i>. Expect music, terrible jokes and silly wigs as we relive the exciting story of the most famous science showdown.</p>	<p><b>AGES 5+</b></p> <p><b>ADVENTURES IN BODY PAINTING</b></p> <p>Learn to identify the anatomy of your own body by painting it! In this hands-on workshop, participants will learn the basics of surface anatomy and then have the chance to paint these structures onto each other or themselves. Basic techniques will be demonstrated so that everyone will feel confident enough to give body painting a try. Materials included.</p>
<p>10.30am and 2.30pm   1 hour</p> <p>£6, family ticket £20 (4 tickets)   Main Hall</p> <p>Presented by Time-Tastical Productions</p>	<p>2.30pm   1 hour</p> <p>£6, family ticket £20 (4 tickets)</p> <p>Dissection Room</p> <p>Presented by dangEditions</p>	<p>3pm   90 mins</p> <p>£7   Basement Gallery 4</p> <p>Presented by Avid Anatomy</p>



 <p>WORKSHOP</p>	 <p>WORKSHOP</p>	 <p>SHOW</p>	 <p>WORKSHOP</p>
<p><b>AGES 8+</b></p> <p><b>EXPLORE OUR WORLD IN MINECRAFT</b></p> <p><i>Minecraft</i> is a game that allows you to manipulate the immersive 3D world around you to create anything that your imagination can conjure. In this workshop you can design your own space in <i>Minecraft</i> as we look to build a better world for ourselves. Participants will become virtual town planners and architects as they build and create anything from new parks and squares to monuments, shelters and tree houses!</p>	<p><b>AGES 6+</b></p> <p><b>HYDROGEN CAR CHALLENGE</b></p> <p>Test your skills as a renewable energy engineer! Design, build and race your very own hydrogen-powered vehicle in a test of efficiency. Try to get the furthest distance on a fixed amount of fuel and compete to beat the best score.</p>	<p><b>AGES 12+</b></p> <p><b>POISONS</b></p> <p>Paracelsus wrote, '<i>All things are poisons, for there is nothing without poisonous qualities. It is only the dose which makes a thing poison.</i>' Many compounds we now consider to be poisons were once found on pharmacy shelves. Before the twentieth century people often got better in spite of their doctor rather than because of them. This talk examines four former medicines, their effects on the body and some killer case studies.</p>	<p><b>AGES 14+</b></p> <p><b>SOLDER ON!</b></p> <p>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 getting your very own kit to solder and take home. This is your chance to learn a vital hacking skill.</p>
<p>2pm   2 hours</p> <p>on until Wednesday 30 March</p> <p>£15   Basement Gallery 3</p> <p>Presented by ComputerXplorers</p>	<p>2.30pm   45 mins</p> <p>on until Tuesday 29 March</p> <p>£10   Main Hall</p> <p>Presented by Arcola Energy</p>	<p>2.30pm   1 hour</p> <p>also on at 10.30am on Tuesday 29 March</p> <p>£6, family ticket £20 (4 tickets)   Dissection Room on Monday and Main Hall on Tuesday</p>	<p>7pm   90 mins</p> <p>also on Wednesday 6 April</p> <p>£15   Hacklab</p> <p>Presented by Edinburgh Hacklab</p>



**WORKSHOP**

**AGES 8+**

**FLOATING PHOTOGRAPHY**  
Test your skills as a renewable energy engineer! Work as a team to complete a series of challenges to send a helium balloon into the sky and take bird's-eye view photographs. Learn about fuel cells, computer programming, and sustainable engineering in a fast-paced, fun-filled workshop! The photographs you take will be available online to download after the workshop.



**WORKSHOP**

**ALL AGES**

**DRAWN TO THE LIGHT: LED SKETCHING**  
Join in on this hands-on workshop, for all ages and artistic abilities, that brings the worlds of science and art together. Photography is one of the best examples of where science and art merge and in this workshop with **Dr Kathryn Harkup** you will learn how to paint, sketch and doodle with light and get the chance to create beautiful images, using long exposure photography and a bit of science along the way.



**WORKSHOP**

**AGES 8+**

**VIDEO GAME DESIGN WITH KODU**  
Would you like to create and play your own video game using an Xbox controller? Then this **ComputerXplorers** workshop is for you! You will use a graphical programming environment to design and build games on a PC, using an Xbox controller to help you build your game quickly. You'll create a range of worlds and terrains and build characters whose movement, sound and vision can be controlled using an intuitive icon-based programming language.



**ACTIVITY**

**AGES 8+**

**WIKIHOUSE DEMONSTRATION BUILD**  
Help build a house in an afternoon! Join volunteers from the Fountainbridge Canalside Initiative, who built the UK's first community WikiHouse, to put together the pieces. WikiHouse is an open source building system with many designers collaborating to make it simple for everyone to design, print and assemble beautiful, low-energy homes. Come along and see just how easy it is by taking part in our build.

10am | 90 mins  
also on Tuesday 29 March  
£7 | Basement Gallery 4  
Presented by Arcola Energy

10.30am | 1 hour  
also on Wednesday 30 March  
£10 | Main Hall

10.30am | 2 hours  
on until Wednesday 30 March  
£15 | Basement Gallery 3  
Presented by ComputerXplorers

1pm and 3pm | 90 mins  
**Free (ticket required) | Courtyard**  
Presented by the Fountainbridge Canalside Initiative



**SHOW**

**AGES 8+**

**UNCANNY VALLEY**  
An interactive show for 8–12 year olds, *Uncanny Valley* asks you, the audience, to interact with a real 'live' robot and help to tell the story of Ada and her best friend OKAY (Outstandingly Knowledgeable Android Youth). Watch as OKAY grows and learns, join in by asking your own questions and see if you can really tell the difference between a robot and a human being. Written by Rob Drummond and presented by Borderline Theatre.

2.30pm | 1 hour | on until Thursday 31 March  
additional show at 7pm on Wednesday 30 March  
and at 10.30am on Thursday 31 March  
£10/£8 | Dissection Room

Commissioned by Edinburgh International Science Festival working in partnership with Imaginate, produced by Borderline Theatre Company, and supported through the Scottish Government's Edinburgh Festivals Expo Fund.

10am FLOATING PHOTOGRAPHY See this page  
10.30am VIDEO GAME DESIGN WITH KODU See this page  
10.30am POISONS See page opposite  
2pm EXPLORE OUR WORLD IN MINERCAFT See page opposite  
2.30pm HYDROGEN CAR CHALLENGE See page opposite

10.30am DRAWN TO THE LIGHT: LED SKETCHING See this page  
10.30am VIDEO GAME DESIGN WITH KODU See this page  
2pm EXPLORE OUR WORLD IN MINERCAFT See page opposite  
2.30pm and 7pm UNCANNY VALLEY See this page



**SHOW**

**ALL AGES**

**ROALD DAHL'S MARVELLOUS MEDICINE**  
Roald Dahl, the beloved creator of children's novels and adult short stories, was fascinated with medicine, and had a lasting impact on it. Join his doctor, **Prof Tom Solomon**, who uses Roald's stories to explain how the body works, what can go wrong and how we can fix it. He describes how Roald invented a medical device and new treatment still used today. You'll also produce Gobblefunk and learn how to make your own marvellous medicine.

2.30pm | 1 hour  
£6, family ticket £20 (4 tickets) | Main Hall



**WORKSHOP**

**AGES 14+**

**EXTREME SOLDERING**  
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.

7pm | 90 mins  
also on Monday 4 April  
£15 | Hacklab  
Presented by Edinburgh Hacklab



SHOW



AGES 4+

**LEAPER: A FISH TALE**

Something fishy's going on! Fish are quickly disappearing from our rivers and seas. Why? And how can one little girl help stop it? *Leaper: A Fish Tale* follows one fish's magical quest against the ever-growing natural and man-made monsters in our waters. Using their signature blend of beautiful puppetry and mesmeric music, **Tucked In** explore the colourful and breathtaking world beneath the water's surface.

WORKSHOP



AGES 14+

**WEARABLE CIRCUITS**

Create your own wearable circuit in this hands-on tech and textiles workshop for beginners. You'll learn some basic electronics and how to design a circuit using LED lights, buzzers and switches and we'll give you as much help as you need with the needlework. Bring along an item of clothing, soft toy, bag, flag, or banner (anything you can sew!) and we'll provide the rest.

WORKSHOP



AGES 10+

**CONDUCTIVE DJ**

Learn to re-mix and create music using a MaKey MaKey and anything that conducts electricity. A MaKey MaKey is an invention kit that turns everyday objects into touchpads and you'll experiment with things including fruit, veg, pots, pans and even your friends! This workshop brings science and music together in a fun and active learning experience that's not to be missed! Option to purchase MaKey MaKey invention kit included in workshop ticket prices.

10.30am and 2.30pm | 1 hour

£6, family ticket £20 (4 tickets) | Main Hall

Presented by Tucked In Productions

10am and 3pm | 3 hours

£30 | Basement Gallery 3

Presented by Remade in Edinburgh

10.30am, 2pm and 4pm | 1 hour

10.30am £40 (includes MaKey MaKey)

2pm and 4pm £10 (workshop only)

Basement Gallery 4

Presented by Capturing Creativity

2.30pm UNICANNY VALLEY (See page 13)



SHOW



AGES 8+

**SCIENCE OF STAR WARS**

*Star Wars* conjures up images of spaceships, super-weapons, and awe-inspiring visions of the future. But these film depictions of life in 'a galaxy far, far away' anticipate real life future science, right here on Earth. Author **Mark Brake** and TV science presenter **Jon Chase** probe the fantastic frontier between movie magic and cutting-edge science, using madcap antics, verve, and flights of fancy inspired by one of the most successful epics in film history. On 2 April ticket includes entry to *Space Day* activities.

2.30pm | 1 hour

also on Saturday 2 April

£6, family ticket £20 (4 tickets)

Dissection Room

Presented by iScience

**SPACE DAY**  
AT SUMMER HALL  
2 APRIL

*Blast off with our special day of out-of-this-world experiences for the whole family. Venture boldly into our amazing digital planetarium, create your own nebula, join the space race, make an intergalactic magazine or learn about the astrolabe whilst crafting one. There's also face painting, space-suit dressing up and more.*

10am-4pm | drop-in | £3.50, under 3s free

SATURDAY APRIL 2 -- SPACE DAY

WORKSHOP



AGES 8+

**BUILD A PROP RAY GUN CHALLENGE**

Movie prop makers are masters of disguises... Did you know that the original *Star Wars* lightsabers were made from the handle of a camera flash? We invite you to take part in our very own prop-making challenge with the help of prop artist **Thom Wall** from Sorenzo Props! Provided with an eclectic mix of everyday household items, we invite you to design and assemble your very own ray gun and turn it into a prop worthy of the movies. Ticket includes entry to *Space Day* activities.

10am and 2pm | 2 hours

£20 | Basement Gallery 4

Presented by MAKLab

Supported by



THE UNIVERSITY of EDINBURGH  
The Alwaleed Centre

WORKSHOP



AGES 11+

### LASER CUT YOUR JEWELLERY FROM SCRAP

At MAKLab, we always have a lot of leftover scraps of material from the laser cutters and, rather than throwing it away, we turn it into beads and pendants. This is your chance to do the same and get creative with waste materials, turning someone else's leftover scraps into jewellery. You'll get the chance to try out our laser cutters and you'll come away with a necklace, bracelet or earrings in a design customised by you!

10am, 1pm and 4pm | 2 hours  
 £20 | Basement Gallery 4  
 Presented by MAKLab

SHOW



ALL AGES

### THE SCIENCE OF SUPERHEROES

Superhero blockbusters have revolutionised cinema. From the celebrity heroes of *The Avengers* to the masked adventures of Batman and Superman, the success of these CGI Marvel and DC universes shows no signs of slowing. But are superpowers mere fantasy? Or could there be an alternate Earth with superbeings? And what's it like being a superhero? **Mark Brake** and **Jon Chase** investigate the truth about the traits that may make you superhuman. In 3D!

10.30am | 1 hour  
 £6, family ticket £20 (4 tickets)  
 Dissection Room  
 Presented by iScience

WORKSHOP



AGES 9+

### DIGITAL MAKER WORKSHOP

Join **Martin Evans** and **Phil Thompson** from Digital Maker for a full on Maker Party! In this interactive workshop you'll learn how computer programming works and get help with coding as you make your own computer game and get hands-on with some interactive electronics.

10.30am and 2.30pm | 90 mins  
 £15 | Basement Gallery 3  
 Presented by Digital Maker

SHOW



ALL AGES

### THE KIDS WHO FELL TO EARTH

Join your heroes Zing and Zong, a brother and sister team from planet Jaahrgon who have crash landed on Earth, as they discover the science that holds the key to saving their threatened civilisation. Watch as they experiment with some of the coldest substances around before uncovering the secrets of space travel to make their way back. This science show is an out of this world epic! On 2 April ticket includes entry to *Space Day* activities.

2.30pm | 1 hour  
 also on at 10.30am on Saturday 2 April  
 £6, family ticket £20 (4 tickets)  
 Main Hall on Friday and Anatomy Lecture Theatre on Saturday  
 Presented by Eureka Edinburgh

SHOW



ALL AGES

### HOW TO BE A SPACE EXPLORER

Want to be an astronaut? Lonely Planet's *How to be a Space Explorer* will help you discover all you need to know about space travel, including how to planet hop, how to pee in a spacesuit and how to build a solar system out of fruit, balloons and bog roll. Author **Mark Brake** and TV presenter **Jon Chase** present a lively, rap-ridden show about space. Ticket includes entry to *Space Day* activities.

10.30am | 1 hour  
 £6, family ticket £20 (4 tickets)  
 Dissection Room  
 Presented by iScience

SHOW



AGES 3+

### SING AND DANCE IN TIME AND SPACE WITH MR BOOM

Mr Boom, the children's one-man band, arrives from the Moon in the spaceship Imagination. Travel with him on an amazing musical adventure through time and space in an exciting animated show that features song, dance and audience participation. Ticket includes entry to *Space Day* activities.

2pm | 1 hour  
 £6, family ticket £20 (4 tickets) | Main Hall

SPECIAL EVENT



ALL AGES

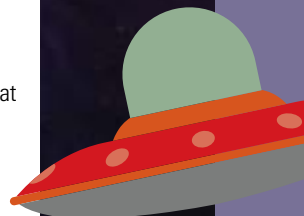
### SCIMART

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 cooking demonstrations, a series of short talks and a variety of interactive stalls, *SciMart* offers up a packed menu and food for thought. New for 2016: learn all about the science of chillies in *Trial by Capsaicin* and have a go at cheesemaking with dairy expert Paul Thomas.

11am-4pm | drop-in  
 £3.50 (under 12s free)

2.30pm SCIENCE OF STAR WARS See page opposite

10.30am THE KIDS WHO FELL TO EARTH See this page





**WORKSHOP**

**AGES 8+**

**BUILD A GEODESIC DOME**

Learn about design by creating complex shapes. Using a variety of 3D printed and lasercut items, learn how to create complex geometric forms from an octahedron to an icosahedron. Find out more about the advantages of the shapes and how they are applied in architecture and design.

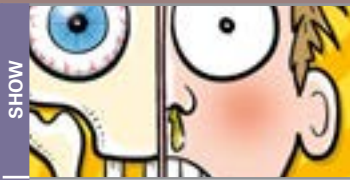


**WORKSHOP**

**AGES 7+**

**MAKE A MONSTER**

Meet some of the strangest animals that exist on our planet and learn how biodiversity and adaptation help them to survive. Inspired by these weird creatures, you'll design and make your very own monster from recycled materials. We'll also help you to capture a photograph of your monster in its natural habitat using our custom Monster Photobooth!



**SHOW**

**AGES 6+**

**HORRIBLE SCIENCE WITH TONY DE SAULLES**

Join *Horrible Science* illustrator Tony De Saulles and celebrate the fantastic series in its 20th year. Pencils at the ready as Tony will teach you how to draw science at its most fascinating... And its most gruesome! An event not to be missed.



**WORKSHOP**

**AGES 10+**

**MAKE YOUR OWN CONTACT SPEAKER**

Get hands-on with science and sound! Using a simple solder kit and a piezo transducer, learn how to create a contact speaker that can turn any surface into an amplifier. Test it against cardboard, plastics, fabrics and other surfaces and find out what materials work best for amplifying sound. At the end of the workshop you'll get to take your contact speaker home!

10am | 2 hours  
also on Tuesday 5 April  
**£20 | Basement Gallery 4**  
Presented by MAKLab

10am and 2pm | 90 mins  
**£10 | Basement Gallery 3**  
Presented by Howling Mouse

10.30am and 2.30pm | 1 hour  
**£6, family ticket £20 (4 tickets) | Dissection Room**  
Presented by Scholastic Publishing

2pm | 90 mins  
also on Tuesday 5 April  
**£20 | Basement Gallery 4**  
Presented by MAKLab



**SHOW**

**ALL AGES**

**SIR MOUSTACHE BRISTLEBY AND THE ED-SPLORERS**

Sir Moustache Bristleby and Co have travelled the world exploring exotic lands and having many marvellous adventures along the way. Though they arrived here quite by accident, there's nothing these three love more than a captive audience. Join them to hear stories of their marvellous adventures, each tale more exhilarating and far-fetched than the last, as they bring shadow puppetry and storytelling theatre for adventurers of all ages to the Science Festival.



**WORKSHOP**

**AGES 12+**

**RE-CASTING PLASTIC**

Get creative with recycling! Festivals and events produce a large amount of waste: food packaging, flyers, plastic bags, bottles and wristbands. Join **STORE** to help turn that waste plastic into new design objects. The process is a small-scale version of industrial recycling: the waste material is sorted, shredded, heated and finally reformed. Each participant will have the chance to design and make a product to take away with them.



**SHOW**

**ALL AGES**

**DR BOOK**

Stuck for something to read? Looking for new and exciting authors to explore? Then visit Edinburgh City Libraries' very own *Dr Book* where our book doctors will dispense advice and suggestions to cure all your reading ailments. You'll even get your own reading prescription to take away with you. Consultations available for children, teens and parents looking for reading ideas for their young ones too. No appointment necessary!

10am SOLDIER ON! See page 12  
10.30am and 2.30pm LOST AT SEA See page opposite

10.30am and 2.30pm | 45 mins  
**£6, family ticket £20 (4 tickets) | Main Hall**

10am and 3pm | 3 hours  
**£25 | Basement Gallery 4**  
Presented by STORE

10am-1pm | drop-in  
also on Thursday 7 April  
**Free | Café**  
Presented by Edinburgh City Libraries



SHOW



AGES 7+

### FRAXI QUEEN OF THE FOREST

Fraxi Queen of the Forest is an ash tree who protects and nourishes her fellow creatures by providing them with light, air, and a place to build their home. Tragedy strikes when news of an airborne disease, chalara, reaches the forest, and to everyone's dismay Fraxi is soon infected. This is a touching story of love, friendship, and resilience written by Scotland New Playwrights Award winner, Jack Dickson.

2.30pm | 1 hour

£6, family ticket £20 (4 tickets) | Main Hall

Presented by Asylon Theatre

7pm EXTREME SOLDERING See page 13

TUESDAY 5 APRIL

WORKSHOP



AGES 7+

### LONELY PLANET KIDS CITY TRAILS

Join author **Moira Butterfield** and *Lonely Planet Kids* on an amazing trip around the world. Soar over the Statue of Liberty, creep along the Catacombs in Paris and discover buried treasure in London! You'll help to create a giant trail around the world using magazines, newspapers and a range of props. The yummiest food, the funniest monster, the most high-tech building, the stinkiest place... Who knows what you'll discover along the way!

10am | 90 mins

£6 | Basement Gallery 3

Presented by Lonely Planet Kids

10am BUILD YOUR OWN GEODESIC DOME See page opposite  
2pm MAKE YOUR OWN CONTACT SPEAKER See page opposite

SHOW



AGES 8+

### LOST AT SEA

Award winning theatre company **Catherine Wheels** find themselves *Lost at Sea* as they explore the biggest subject they could possibly try and tackle – the ocean. The journey begins with a boy and a girl, fascinated by the story of 28,800 bath toys that accidentally ended up flung into the unrelenting currents of the Pacific Ocean. Their investigation sees them uncover the mysteries of the sea and discovering its importance to every one of us on Earth.

2.30pm and 7pm | 1 hour

also on Wednesday 6 and Thursday 7 April at 10.30am and 2.30pm

£10/£8 | Dissection Room

Commissioned by Edinburgh International Science Festival working in partnership with Imagination, produced by Catherine Wheels Theatre Company, and supported through the Scottish Government's Edinburgh Festivals Expo Fund.

The Scottish Government  
Riaghaltas na h-Alba

SUMMERHALL

WORKSHOP



ALL AGES

### LONG DEAD BEASTS: AND HOW TO KNOW THEM

How do scientists really know what life was like on Planet Earth all those years ago? Learn about fossils, dinosaurs and the tools scientists use to unravel ancient life, get hands-on with more than 2,000 fossils and search for dead insects trapped in Madagascan amber. **Jules Howard**, freelance zoologist, author and presenter, will be your guide in this interactive workshop where you'll uncover the mysteries of ancient life on Earth.

10am | 1 hour

also on Friday 8 April

£6 | Basement Gallery 4

10am DR BOOK See page opposite  
10.30am and 2.30pm LOST AT SEA See this page

SHOW



ALL AGES

### THE UGLY ANIMAL ROADSHOW

Why should the panda get all the praise? The Ugly Animal Preservation Society is dedicated to raising the profile of the world's most aesthetically challenged endangered species. Join biologist and presenter **Simon Watt** for a performance that celebrates and explores the incredible biology of the animal kingdom's most monstrous, featuring videos, demonstrations and lots and lots of audience participation.

10.30am | 1 hour

also on at 2.30pm on Friday 8 April

£6, family ticket £20 (4 tickets)

Red Lecture Theatre on Thursday and Dissection Room on Friday

WORKSHOP



AGES 10+

### MAKE AN LED HULA HOOP

Join **Trina Dinnis** and learn how to build your own beautiful light-up hoop using LEDs and plastic tubing in this fun and interactive workshop. Learn how LEDs work and how to build them into circuits. You'll also discover the scientific secrets of successful hooping and how to draw spirographs with light.

10am and 2pm | 3 hours

£35 | Main Hall

THURSDAY 7 APRIL

WORKSHOP



AGES 9+

**MADLAB SPACEFLAG**

Join MadLab in this hands-on electronics workshop to build a SpaceFlag! A SpaceFlag is a gadget that uses persistence of vision to display a message as it's waved. Learn how to solder and build your own kit.

10am LONG DEAD BEASTS: AND HOW TO KNOW THEM See page 17

10am, 1pm and 3.30pm | 90 mins  
£15 | Basement Gallery 3  
Presented by MadLab

SHOW



ALL AGES

**SWAT! A FLY'S GUIDE TO STAYING ALIVE**

A funny, fact-filled family show about housefly survival and insect biology performed by author and *Private Eye* cartoonist Mike Barfield. *SWAT!* is based on the critically acclaimed book of the same name. This highly interactive show is packed full of audience participation, jokes, props, peril and poo! You'll come away having learned more than you ever wanted to know about the humble housefly.

10.30am and 2.30pm | 1 hour  
£6, family ticket £20 (4 tickets) | Main Hall

WORKSHOP



AGES 14+

**MAKE A SILVER RING**

Have a taste of jewellery making by creating your own silver ring with jeweller Scarlett Erskine. Learn basic skills of saw piercing, texturing and soldering metal by making your own silver ring to take home.

2.30pm THE UGLY ANIMAL ROADSHOW See page 17

2.30pm and 6.30pm | 2 hours  
£30 | Basement Gallery 1

11am PAPER CIRCUITS See page 11

**Edinburgh Mini Maker Faire®**

The *Edinburgh Mini Maker Faire* is back for its fourth year, highlighting the diversity of human creativity by bringing together makers from all sorts of unexpected areas under one big roof. This year we're better than ever before and you'll be treated to gadgets, hardware, software, knitwear and food. This is a chance for the whole family to come out and interact with unbelievable technology and discover the hidden gems that are worked away at by creative makers across the country.



Supported by



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



Supported by Headline Sponsor



10am–5pm | drop-in  
£6/under 3s free

# Edinburgh's international children's festival

  
imagine  
festival  
28 MAY - 5 JUNE 2016

- The world's best theatre and dance for children and young people
- 14 shows from 9 different countries
- Exciting programme for all ages
- Family tickets @ £8 per person

Pick up a programme in venues around Edinburgh or go to  
[imagine.org.uk](http://imagine.org.uk)

**FAMILY FRINGE OPENING WEEKEND (28-29 May) at the National Museum of Scotland**  
Performances and free activities all day - perfect for primary-aged kids

 **Lothian Buses**

Proudly supports the **Edinburgh International Science Festival**

## Did you know?

Taking the bus to the Science Festival could  $\frac{1}{2}$  your CO<sub>2</sub> emissions compared to taking your car.



**1** journey to a Science Festival venue by car creates the same amount of CO<sub>2</sub> as taking **27** bus journeys (that's a bus to every venue!)

## Travel between 24 Science Festival venues with 1 ticket

Enjoy great value & unlimited travel\* on bus & tram with a DAYticket.

Child  
£2

Adult  
£4

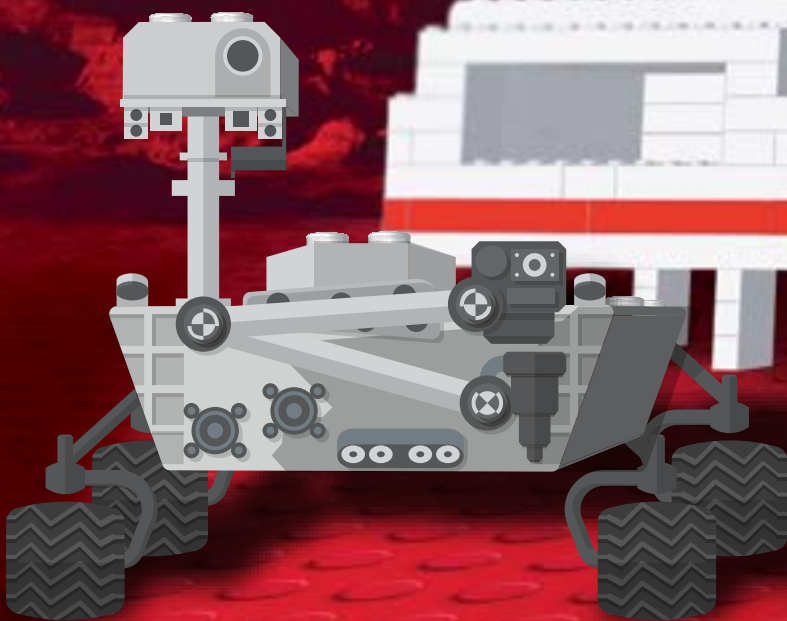
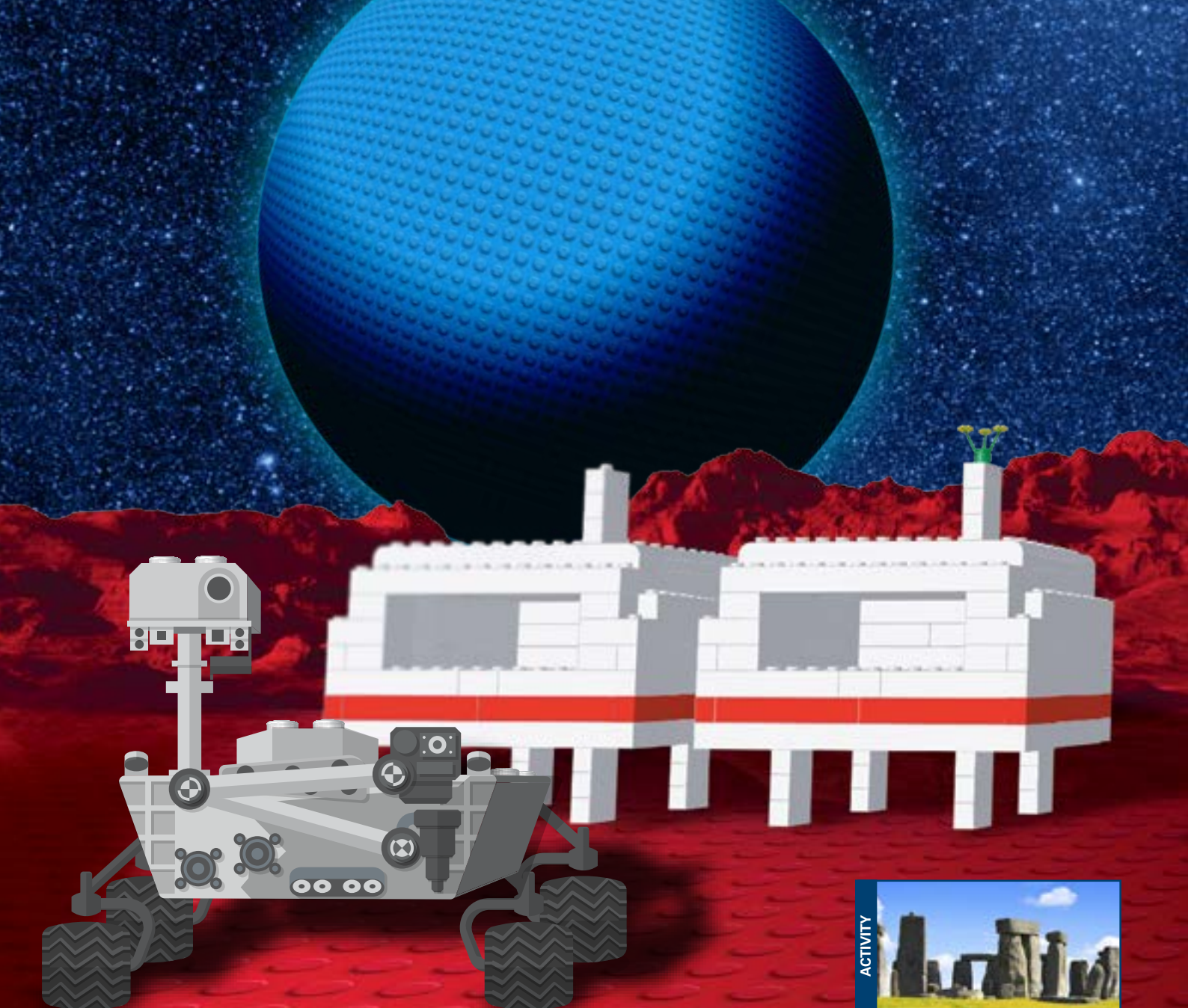
Family  
£8.50

**Bus routes to the major venues:** National Museum of Scotland 2, 23, 27, 35, 41, 42, 45, 47, 67  
Edinburgh Zoo 12, 26, 31 | Summerhall 41, 42, 67 | Royal Botanic Garden Edinburgh 8, 23, 27

\*Valid within the City Fare zone. Excludes Airlink, Edinburgh Airport tram stop and Edinburgh Bus Tours. Prices are correct at time of printing - January 2016.



## We think the world of Edinburgh



## FAMILY EVENTS

Help build a better world at the museum! Join us on a LEGO® brick adventure in the Grand Gallery featuring the *Mars Master Constructors* big build and look out for sensational pop-up science in Hawthornden Court.

Museum open daily | 10am–5pm

### ALSO AT THE MUSEUM...

Grown-up visitors can also join in the fun at the Museum as we have over 30 events for adults, including the return of our spectacular space party the *Big Bang Bash* (p.47). See p.35–61 for further details of our adult event programme.



National  
Museum of  
Scotland

# MARS MASTER CONSTRUCTORS

Humanity's first Mars Colony needs your help! Come and build pods, buildings, labs, habitats, and anything else you think that humans need to live on another planet. Our first building has been designed and crafted by renowned artist in LEGO® bricks, Warren Elsmore. Now it is up to you to add to the Mars landscape and help construct the first colony.

Saturday 26 March–Sunday 10 April

10am–5pm | drop-in

Free | Grand Gallery

This event is not organised by the LEGO® Group

ACTIVITY



ALL AGES

## POP-UP SCIENCE: CHANGING WORLDS

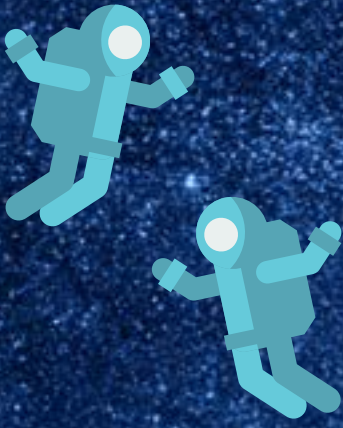
Recent research on iconic sites around Britain – including Stonehenge, Orkney, the North Sea and Jersey – has shown that adaption to a changing world was as essential a part of life for the inhabitants of northern Europe in the past as it is today and will be in the future. Explore this fascinating exhibit and discover the story of our ancestors as you investigate the links between their society and the changing world around them.

Saturday 26–Sunday 27 March

10am–5pm | drop-in

Free | Hawthornden Court

Presented by University of St Andrews



# NATIONAL MUSEUM OF SCOTLAND

## FAMILY EVENTS FROM THE UNIVERSITY OF EDINBURGH

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



THE UNIVERSITY of EDINBURGH

ACTIVITY



ALL AGES

### FINDING THE ARC IN ARCHITECTURE

Can you build a bridge without nails or glue? Can you make a curved tower out of straight sticks? Can you design a building that would melt a car? Find out how maths is the key to all these questions and how it influences architecture in the world around us.

Saturday 26–Wednesday 30 March  
10am–4.30pm | drop-in

Free | Learning Centre Level 2

Presented by The University of Edinburgh

ACTIVITY



ALL AGES

### EXPLORING THE RAINFOREST

Do you know how important rainforests are for the health of our planet? Join our team of geoscientists to discover the role that our precious rainforests play in environmental change and get hands-on with some interactive activities.

Saturday 26–Wednesday 30 March  
10am–4.30pm | drop-in

Free | Learning Centre Level 2

Presented by The University of Edinburgh

ACTIVITY



ALL AGES

### GREEN CHEMISTRY

Go green with the School of Chemistry. From air pollution to recycling, find out how chemists at The University of Edinburgh are making the planet a greener place. Have a go at your own chemical reactions, explore the atmosphere and learn how chemistry can save the world!

Saturday 26–Wednesday 30 March  
10am–4.30pm | drop-in

Free | Learning Centre Level 2

Presented by The University of Edinburgh



**ALL AGES** **ACTIVITY**

**ROBOT LAB**

Come and interact with robots from the Edinburgh Centre for Robotics. From an assembly line robot that wants to learn how to work with you, to cute football playing robots, learn about the many ways in which robots are trying to understand and imitate human beings.

Saturday 26–Wednesday 30 March  
10am–4.30pm | drop-in  
Free | Learning Centre Level 2  
Presented by The University of Edinburgh



**AGES 7+** **WORKSHOP**

**FANTASTIC PLASTIC!**

Plastics are everywhere but how do we make them, how do we use them and how do we get rid of them? Join chemists from The University of Edinburgh to find out. In this hands-on workshop you'll become a scientist for an hour, have a go at some plastic making and breaking, conduct your own experiment and learn all about *Fantastic Plastic!* For ages 7–10, each ticket also admits one adult if desired.

Saturday 26–Wednesday 30 March  
11am | 1 hour  
Free (ticket required)  
Learning Centre Level 4, Studio 1  
Presented by The University of Edinburgh



**AGES 8+** **WORKSHOP**

**JUNKYARD CLUSTERS**

How often do we look inside a computer? How many of us can build a PC? Come join a team of friendly technicians from The University of Edinburgh to build a PC, plug it in, start it up and then make it work in a cluster (and find out what a cluster is!). Perfect for children aged 8+ and their families.

Saturday 26–Wednesday 30 March  
12pm and 2pm | 1 hour  
Free (ticket required)  
Learning Centre Level 4, Seminar Room  
Presented by The University of Edinburgh



**ALL AGES** **ACTIVITY**

**POP-UP SCIENCE: WIND TUNNEL CHALLENGE**

Take the *Wind Tunnel Challenge!* Stand in the artificially generated gust and try to guess its speed in our mini-wind generator. You can even get a photo of yourself in the air flow!

Saturday 26–Sunday 10 April  
10am–5pm | drop-in  
Free | Hawthornden Court  
Supported by



**ALL AGES** **ACTIVITY**

**POP-UP SCIENCE: DR BOOK**

Stuck for something to read? Looking for new and exciting authors to explore? Then visit *Dr Book* where our book doctors will dispense advice and suggestions to cure all your reading ailments. You'll even get your own reading prescription to take away with you. Consultations available for children and teens – no appointment necessary!

Wednesday 30–Thursday 31 March  
10am–5pm | drop-in  
Free | Hawthornden Court  
Presented by Edinburgh City Libraries

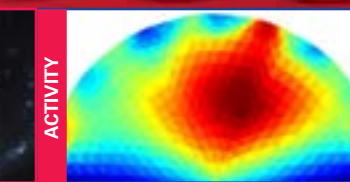


**AGES 7+** **SHOW**

**LOST IN SPACE 3D**

What is it like to be human in a vast and violent universe? Deep in the Milky Way, with rocks raining on the Earth, are we just pointless specks of dust? The answer may surprise you. Join **Andy Lawrence** on an immersive journey through the Universe, with music, words, and 3D graphics. Perfect for age 7+ and their families. Children must be accompanied by an adult.

Wednesday 30 March–Thursday 1 April  
11am | 1 hour  
Free (ticket required) | Auditorium  
Presented by The University of Edinburgh

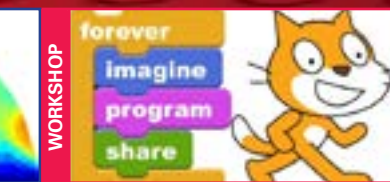


**ALL AGES** **ACTIVITY**

**SEEING INSIDE**

Imaging techniques such as X-ray and MRI have become very familiar but there are other ways to look inside things. Join engineers from The University of Edinburgh to find out about a new state-of-the-art imaging technique that you may not have heard of! Get hands-on with an agile imaging instrument and discover how it can help to make the world more visible.

Thursday 31 March–Monday 4 April  
10am–4.30pm | drop-in  
Free | Learning Centre Level 2  
Presented by The University of Edinburgh



**AGES 8+** **WORKSHOP**

**GAME ON!**

Explore the exciting world of video games, learn the basics of coding in *Scratch*, a visual programming language, and design and build your very own computer game! This workshop offers a hands-on and playful taster session in computer programming. For ages 8+ but perfect for ages 10–14. Each ticket also admits one adult if desired.

Thursday 31 March–Monday 4 April  
12pm and 3pm | 1 hour  
Free (ticket required)  
Learning Centre Level 4, Studio 1  
Presented by The University of Edinburgh

WORKSHOP

AGES 7+



### THE BACTERIAL CIRCUS

Meet the physicists investigating how bacteria stick to surfaces and swim through tiny channels. In this hands-on workshop you'll use microscopes to see bacterial cities. Watch how the bugs react to being put through their paces, learn how the bacteria can be controlled and design a pattern to corral the bugs into with light. For children aged 7–11 and one accompanying adult (adults need a ticket too).

**Sunday 27–Wednesday 30 March**  
 3pm | 1 hour  
 Free (ticket required)  
 Learning Centre Level 4, Studio 1  
 Presented by The University of Edinburgh

ACTIVITY

ALL AGES



### POP-UP SCIENCE: ROBOTS

Join us in this hands-on activity making LEGO® robots perform simple tasks using the *Scratch* programming environment. The drag-and-drop interface is easy to pick up with no experience – even parents can do it! You can also have a play with pre-prepared robot-based activities – robot sumo, anyone?

**Monday 28–Tuesday 29 March**  
 10am–5pm | drop-in  
 Free | Hawthornden Court  
 Presented by Edinburgh Napier University

WORKSHOP

AGES 3+



### MINI ENGINEERS

Build it, fix it, move it! What happens when I turn a handle? How can I lift something heavy? Explore how cogs, wheels, pulleys and all kinds of mechanics help us in our everyday lives in this construction challenge for 3–5 year olds. Limited places. Pre-book for 10.30am session or book on the day in the museum for 11.30am session. Each ticket also admits one adult.

**Monday 28 March–Saturday 2 April**  
 10.30am and 11.30am | 40 mins  
 Free (ticket required)  
 Learning Centre Level 4, Studio 2  
 Presented by National Museum of Scotland

ACTIVITY

ALL AGES



### POP-UP SCIENCE: NEST BUILDING

Get hands-on to find out why and how birds build nests. Explore the pieces of art and architecture that are influenced by bird nests. Examine nests from local and exotic birds, match the bird to the nest that it built and make a nest of your own to take home or leave in our special museum trees.

**Wednesday 30–Thursday 31 March**  
 10am–5pm | drop-in  
 Free | Hawthornden Court  
 Presented by University of St Andrews

ACTIVITY

ALL AGES



### BIO-DISCOVERIES

How do tiny microscopic animals survive a drought? How can fruit flies help us understand motor neurone disease? Meet a team of biologists from The University of Edinburgh to find out what new things they've discovered over the past year about animals, plants and other living things. Then get hands-on and make some exciting discoveries for yourself under the microscope.

**Thursday 31 March–Monday 4 April**  
 10am–4.30pm | drop-in  
 Free | Learning Centre Level 2  
 Presented by The University of Edinburgh

WORKSHOP

AGES 8+



### POP-UP ENGINEERING

Pop-ups may look simple, but they are ingenious engineering mechanisms. Pop in and make one yourself! 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 31 March–Monday 4 April**  
 10am–4.30pm | drop-in  
 Free | Learning Centre Level 2  
 Presented by The University of Edinburgh

ACTIVITY

ALL AGES



### AFTER THE HIGGS BOSON, WHAT'S NEXT?

Enter the Cosmic Ray Doorway to discover the world of particle physics and how we can explore the building blocks of the whole universe. Drive a particle accelerator, watch cosmic rays glide through our cloud chamber, and discover why the Higgs Boson is so important.

**Thursday 31 March–Monday 4 April**  
 10am–4.30pm | drop-in  
 Free | Learning Centre Level 2  
 Presented by The University of Edinburgh

ACTIVITY

ALL AGES



### CHILDREN AND TECHNOLOGY

New technologies designed for young children are developing fast. Get hands-on, learn computing from a toy, move coloured blocks just by gesturing and discover the latest mobile and tablet learning games... Then tell us your thoughts. Researchers from Edinburgh's Children and Technology group welcome both children and adults to explore, debate, play and share thoughts and experiences on technology in children's lives.

**Thursday 31 March–Monday 4 April**  
 10am–4.30pm | drop-in  
 Free | Learning Centre Level 4, Seminar Room  
 Presented by The University of Edinburgh

ACTIVITY



ALL AGES

### POP-UP SCIENCE: THE SCIENCE OF TRANSPLANTATION

Organ transplantation is one of the miracles of modern medicine. Despite being performed for over 50 years, transplantation is far from routine. This hands-on activity will explore how organ transplants are assessed for blood group compatibility, the types of organs that can be transplanted, what a tissue type actually is and how scientists measure if donors and recipients are suitable for transplant.

Friday 1–Saturday 2 April

10am–5pm | drop-in

Free | Hawthornden Court

Presented by NHS National Services Scotland

ACTIVITY



ALL AGES

### POP-UP SCIENCE: ENIGMA MACHINE

Take part in a recreation of the Second World War code-breaking process! Take your chance to encrypt a message on a genuine Enigma machine and get a closer look at manual codes and ciphers produced for Allied agents in the days leading up to D-Day.

Friday 1–Saturday 2 April

10am–5pm | drop-in

Free | Hawthornden Court

ACTIVITY



ALL AGES

### POP-UP SCIENCE: ORGANOGENESIS

Discuss cutting-edge science with stem cell scientists and co-create origami organs in this interactive, drop-in exhibition. The craft of origami provides many in-ways for discussions about the biology of organogenesis and the cutting edge work of growing organs from stem cells in the lab. Find out more about making organs in the lab and its application in transplantation, drug testing, disease modelling and regeneration of damaged organs.

Sunday 3–Monday 4 April

10am–5pm | drop-in

Free | Hawthornden Court

Presented by Eurostemcell  
image: Horst Keichele

ACTIVITY



ALL AGES

### POP-UP SCIENCE: MAKE MUSIC WITH SCIENCE

Join musicians and scientists from The University of Edinburgh to discover the science of music and the instruments that make it. Find out why a violin sounds different from a flute, why a trumpet has valves and why the renaissance sackbut sounds different from the modern trombone. You might even get the chance to play an instrument yourself. Visitors can participate as much as they want or simply stand back and enjoy the music.

Sunday 3–Monday 4 April

10am–5pm | drop-in

Free | Hawthornden Court

WORKSHOP



AGES 6+

### AMAZING IMMUNOLOGY

Reveal the secrets of your immune system in a fun interactive session where you'll explore allergies, infections and vaccinations with real medical research scientists. Help Denny and the T-Team find and solve 3D puzzles, try the Rash Decisions ball pool challenge and complete your Immunological Stickers story. For ages 6–11, each ticket also admits one adult if desired.

Tuesday 5–Friday 8 April

3pm | 1 hour

Free (ticket required)

Learning Centre Level 4, Studio 1

Presented by The University of Edinburgh

ACTIVITY



ALL AGES

### DISCOVER MEDICAL SCIENCE

Medical scientists investigate how humans work and find new ways to treat illness and injury. Join scientists from The University of Edinburgh and get hands-on with their cutting-edge research! Measure your blood pressure, feel the weight of your brain, explore how your lungs work, and ask cancer research scientists what they actually do in the lab.

Tuesday 5–Saturday 9 April

10am–4.30pm | drop-in

Free | Learning Centre Level 2

Presented by The University of Edinburgh

WORKSHOP



AGES 8+

### BRAIN BOX

What's in the *Brain Box*? There are clues inside but you'll need to use your brain to work it out! Become a brain scientist, find out how amazing your brain is and investigate how it works. Follow us on Twitter @brainboxone. For ages 8–12, each ticket also admits one adult if desired.

Tuesday 5–Saturday 9 April

12pm | 1 hour

Free (ticket required)

Learning Centre Level 4, Studio 1

Presented by The University of Edinburgh

SHOW



AGES 7+

### DR BUNHEAD'S EASTER BUNNY BAZOOKA

The world's fastest rabbit, exploding Easter eggs, the first Jelly Babies into space and much more feature in this celebration of Easter-themed science. Join TV's favourite stunt scientist Dr Bunhead on this joy-ride through science mayhem. Warning! May lead to serious addiction to science. Contains loud bangs and traces of nuts. Also look out for Dr Bunhead and his mini science puppet shows popping up around the Museum on Monday 4 and Tuesday 5 April.

Wednesday 6–Friday 8 April

11am | 1 hour

£6 | Auditorium

Presented by The University of Edinburgh



SHOW



**THE CHEMISTRY SHOW**

Expect bangs, flames and foam in a classic show of experiments and fun with two of Scotland's best communicators! How cold can we go? How can we make oxygen? And why should a lettuce be very, very afraid of **Paul Murray** and **Robin Andrews**? This vibrant show returns with a bang (or five). There might even be a song.

**Monday 4–Tuesday 5 April**  
**11am | 1 hour**  
**Free (ticket required) | Auditorium**  
 Presented by The University of Edinburgh

WORKSHOP



**AGES 3+ TEDDY BEAR HOSPITAL**

Inspired by the National Museum of Scotland's new science galleries, we're having a look behind the scenes at our very own *Teddy Bear Hospital*. Find out what makes Teddy's body work, as well as your own, and discover how we use science to make us all better when things don't go quite right. For ages 3–5, each ticket also admits one adult. Limited places. Pre-book for 10.30am sessions or book on the day at the Museum for 11.30am sessions.

**Monday 4–Saturday 9 April**  
**10.30am and 11.30am | 40 mins**  
**Free (ticket required)**  
**Learning Centre Level 4, Studio 2**  
 Presented by National Museums Scotland and supported by Wellcome Trust

ACTIVITY



**ALL AGES POP-UP SCIENCE: SCI-FUN ROADSHOW**

Join the fun at this interactive mobile science centre from The University of Edinburgh, featuring over fifty incredible activities. Control lightning, see a hole in your hand, solve a crime, generate electricity, confuse your senses, become part of a human circuit and relax in a spinning chair.

**Tuesday 5–Wednesday 6 April**  
**10am–5pm | drop-in**  
**Free | Hawthornden Court**  
 Presented by The University of Edinburgh

ACTIVITY



**ALL AGES POP-UP SCIENCE: SQUIRREL WARS**

Learn about red squirrel conservation and mathematics in this hands-on activity. Until around 150 years ago, red squirrels were the only squirrel species in the UK. Mathematical models developed on a computer can represent the complex interaction between red and grey squirrels. Make your own red or grey squirrel and place it on a map of Scotland to see how your prediction matches the mathematical models.

**Thursday 7–Friday 8 April**  
**10am–5pm | drop-in**  
**Free | Hawthornden Court**  
 Presented by Heriot-Watt University

ACTIVITY



**ALL AGES POP-UP SCIENCE: VIEW FINDER**

The Royal Photographic Society, supported by Siemens, brings scientific photography to the Festival. Drop by the pop-up stand to see how to create slow-motion movies and stunning microscope images, all with little more than your own smartphone and a bit of imagination!

**Thursday 7–Friday 8 April**  
**10am–5pm | drop-in**  
**Free | Hawthornden Court**  
 Supported by



WORKSHOP



**AGES 9+ DNA, DOLLY AND YOU**

Join our team of scientists to find out what makes Dolly the sheep so special and discover how her birth 20 years ago has helped to improve human and animal health. Get hands-on with fun activities all about Dolly, DNA and you! For ages 9–14, each ticket also admits one adult if desired.

**Thursday 7–Saturday 9 April**  
**11am, 1pm and 3pm | 1 hour**  
**Free (ticket required)**  
**Learning Centre Level 4, Seminar Room**  
 Presented by The University of Edinburgh

ACTIVITY



**ALL AGES POP-UP SCIENCE: ENVIRONMENTAL DETECTIVES**

Join the Scottish Environment Protection Agency's investigative scientists to look at the importance of identifying pollutants and those responsible for causing pollution. In this series of fun and hands-on experiments you'll explore 3D life-like simulations, investigate bugs to work out how polluted a water source is and see how microplastics block the guts of water bugs and fish.

**Saturday 9–Sunday 10 April**  
**10am–5pm | drop-in**  
**Free | Hawthornden Court**  
 Presented by SEPA

# PLANET BOTANICS



## ROYAL BOTANIC GARDEN EDINBURGH

Find hands-on workshops and fun for all the family at the Botanics with activities, events and exhibitions to suit all ages.

Garden open daily | 10am–6pm

### ALSO AT THE BOTANICS...

Explore exhibitions at the Botanics to focus on how objects are being rethought (*British Art Show 8*, p.35) or consider how many of the world's greatest inventions combine human intellect with inspiration from nature (*Nature Mother of Invention*, p.35).

Discover how translocation can provide endangered species with a second chance in *Nature's TARDIS* (p.46), and find out about developments in biomimetics in *Inspired by Nature* (p.61). There's even a chance to enjoy a taste of the gardens as you follow on from some foraging with a three-course gourmet lunch in *Wild, Scottish and Free* (p.48).



Royal  
Botanic Garden  
Edinburgh

SHOW



AGES 3+

### THE WORM, AN UNDERGROUND ADVENTURE

Underneath your feet in the muddy brown soil squirms the world's best kept secret... A wonderful, magical creature called the worm. Join Wilma and William, two nature lovers, on a journey underground as they discover a family of friendly, musical worms and their colourful miniature world. Then join *Eco Drama* after the performance, as they invite you to see some real worms in a specially designed wormery. Part of *Puppet Animation Festival*.

Thursday 7–Friday 8 April

11am and 2pm | 1 hour

£6 adult, £5 child | Real Life Science Studio,  
John Hope Gateway

SHOW



AGES 5+

### THE SPRING FLOWER SHOW

If it wasn't for the green stuff (chlorophyll) all around us, we simply wouldn't exist. Come and enjoy the beauty of plants and discover more about the science of planting, growing and exhibiting flowers. Try your hand at becoming a daffodil judge for the day at *The Caley Spring Flower Show* and get involved in free seed planting activities at the *Children's Spring Flower Show*.

Saturday 2–Sunday 3 April  
12pm–5pm | drop-in

Free entry to the Children's Spring Flower Show.  
Pay £3 adult admission charge on the day for The Caley Spring Flower show  
Child/students/RCHS members free  
Real Life Science Studio, John Hope Gateway

In association with The Royal Caledonian Horticultural Society and the Children's Spring Flower Show

ACTIVITY



AGES 4+

### SURVIVAL OF THE SMARTEST!

Are you a fearless explorer? Could you survive in the wild? Visit our explorer's camp and meet some of our intrepid scientists as you head on an adventure to discover some of the smartest plants in the world. Learn about some of the incredible ways plants adapt to survive and track down the plants that might just be able to help you survive in an emergency!

Monday 4–Sunday 10 April  
11am–4pm | drop-in

Tickets purchased on the day for £1 per trail.  
Normal admission to the Glasshouses also applies:  
£5.50 adult, £4.50 concession,  
child under 15/RBGE members free | Palm House

WORKSHOP



AGES 5+

### BUILDING BETTER HOMES FOR ANIMALS: A GUIDE FOR HUMANS

Join us to discover the importance of mini-beasts! The health of the environment depends on lots of small critters that help to recycle energy and nutrients. Without them, our farms and wildlife would struggle. Join Scotland's Rural College to build your own mini-beast home and discover how important these overlooked animals really are.

Monday 4 April  
11am–4pm | drop-in

Free | Real Life Science Studio,  
John Hope Gateway

WORKSHOP



AGES 5+

### BACK TO THE FUTURE FOOD

We're going back to the future, without the rehydrated pizza. Discover the science of tastier, more nutritious food with scientists from the Rowett Institute of Nutrition and Health. Journey into the past to find out how vegetable ancestors could improve food today and peer into the future to see how technology could change the way we think about food.

Tuesday 5 and Wednesday 6 April  
11am–4pm | drop-in

Free | Real Life Science Studio,  
John Hope Gateway

WORKSHOP



AGES 5+

### FARMYARD ANIMALS: FRIENDS AND FOES

Join us for an interactive family-friendly session to discover how scientists from the Moredun Research Institute help keep farm animals healthy here in Scotland and around the world. Together with Farmer Fred and all our Farmyard Heroes, have fun exploring why healthy and happy farm animals are important for animal welfare, livelihoods and the environment.

Saturday 9 April  
11am–4pm | drop-in

Free | Real Life Science Studio,  
John Hope Gateway

WORKSHOP



AGES 5+

### BUG BUSTING TREES

Join scientists from the PROTREE project in an adventure to understand how we can help trees to fend off the bugs that would attack them. Get hands-on, meet the main offenders, and discover how trees are able to defend themselves if only we allow them to. Take the chance to help with the testing of a new computer game about tree health.

Sunday 10 April  
11am–4pm | drop-in

Free | Atrium, John Hope Gateway

WORKSHOP



ALL AGES

### ART EXPLORERS

Head along to the Royal Botanic Garden Edinburgh for an afternoon of creative fun. Get inspired to make your own work of art as we explore the beauty of trees from the Garden using a wide range of colourful and tactile materials with Greengage Arts.

Sunday 10 April  
1pm–4pm | drop-in

Pay £3 admission on the day at the venue  
Real Life Science Studio, John Hope Gateway

WORKSHOP



AGES 5+

### THE SCIENCE OF SURVIVAL

All living things need the same elements to survive: food, water and shelter. Different creatures go about getting these essential elements in some very different ways. Find out about the eating and sleeping habits of native Scottish wildlife and test out some wilderness survival skills for yourself in this interactive workshop led by RSPB Scotland.

Wednesday 6 and Saturday 9 April  
11am–4pm | drop-in

Free | Botanic Cottage

# RZSS EDINBURGH ZOO



## RZSS EDINBURGH ZOO

Go wild at the Zoo this Easter and discover a range of science events in addition to all the usual animal antics. You'll find activities and exhibitions throughout the day and, once the sun goes down, join us on our animal planet for some nocturnal fun with street food, science and even a movie!

**Zoo open daily | 9am–5pm**

### ALSO AT THE ZOO...

For even more family fun don't miss the Zoo's *Wild about Scotland bus* stopping at sites around the city throughout the Festival (p.33). Older audiences can discover the challenges that arise when trying to get pandas to mate in *The Science of Panda Breeding* (p.41) and enjoy a culinary adventure amongst the animals in *Feeding Time at the Zoo* (p.46).



EXHIBITION



ALLAGES

### KELPIE MAQUETTES AT THE ZOO

*The Kelpie Maquettes* are a touring exhibition of 1/10th scale models of *The Kelpies* from The Helix Parkland in Falkirk. Standing at three metres high, they will be on display at Edinburgh Zoo, with the stunning backdrop of the Pentland Hills, throughout the Science Festival. Hand-crafted by renowned sculptor Andy Scott, the models have travelled as far as New York and Chicago.

ACTIVITY



ALLAGES

### EASTER ENRICHMENT

Enrichment promotes appropriate natural behaviours, such as foraging for food and nesting. Come along to the Zoo to see animals receiving Easter-themed enrichment to stimulate their natural behaviours. Join in the enrichment-making session in the morning and get creative as you make some themed items for our animals. Then watch in the afternoon as the keepers give the animals the items you have made.

Friday 25 March–Sunday 10 April  
9am–5pm | drop-in  
Free with admission

Saturday 26 March  
10.30am–4pm | drop-in  
Free with admission



ACTIVITY



ALL AGES

**LIVING LINKS AT EDINBURGH ZOO**

Come and explore *Living Links* in Edinburgh Zoo. This fascinating field station is a research centre for the study of primates. Its large enclosure houses two intelligent, social and fun species, brown capuchin and common squirrel monkeys. You can meet researchers, learn about research being undertaken and try your hand at some interactive activities, from computer games to having a go at a problem set for chimpanzees.

Saturday 26 March—Sunday 10 April  
9am—5pm | drop-in  
Free with admission

ACTIVITY



ALL AGES

**MINI BIOBLITZ AT THE ZOO**

We're having a *Mini BioBlitz at the Zoo*, the aim is to find and identify as many wee beasties as we can in just 6 hours. We'll be looking everywhere, up trees, under logs and even in the pond, to track down all the creepy crawlies and work out what they are. You can also have a go at some mini-beast themed craft, learn how to make a pond in a bucket and create your own mini-beast hotel.

Sunday 3 April  
10am—4pm | drop-in  
Free with admission | Wildlife Garden

FILM



ALL AGES

**LIFE OF PI AND TIGER TALK**

Could you really survive on a boat in the open ocean with a tiger? In *Life of Pi* (2012, PG) director Ang Lee created a ground-breaking movie about a young man, hurtled into an epic adventure, who forms an unexpected connection with a fearsome Bengal tiger. Join one of Edinburgh Zoo's tiger keepers for a short talk on tiger behaviour, looking at their Sumatran tigers Baginda and Jambi, then settle down to watch the movie in the most apt of settings.

Tuesday 5 April  
6.30pm | 3 hours  
£12, joint ticket £22 (2 tickets)  
Budongo Trail

SPECIAL EVENT



ALL AGES

**SCIENCE NIGHT AT THE ZOO**

Join us for a special edition of Edinburgh Zoo's *Nights* events. As well as the usual silent disco, comedy, photo stations and music there will be a mix of interactive science stations where you can find out more about the work done by the Royal Zoological Society of Scotland. Plus you'll get the chance to have a wander around the Zoo after hours and sample some street food while taking in the sights and sounds.

Saturday 9 April  
4.30pm | 4 hours  
£12 adult, £10 RZSS member, £8 child

# SUMMERHALL

Summerhall is back as Edinburgh International Science Festival's hub for 2016. During the day, it will be packed with activities for children and families and in the evening it will be filled with entertaining events for adults and teenagers.

You'll find sensational science shows offering a world of new experiences for all ages along with interactive workshops for young people and adults that are full of scientific and creative challenges, from building a ray gun to making a monster.

Listings of events for children and families are included in the following pages and full details of events for adults can be found in the adult events section, p.35–61.

Blackwell's pop-up bookshop will be open every day in the courtyard chalet.

## VENUE SPONSOR

Baillie Gifford is delighted to support the Science Festival's hub, 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.

[bailliegifford.com](http://bailliegifford.com)



Investment managers



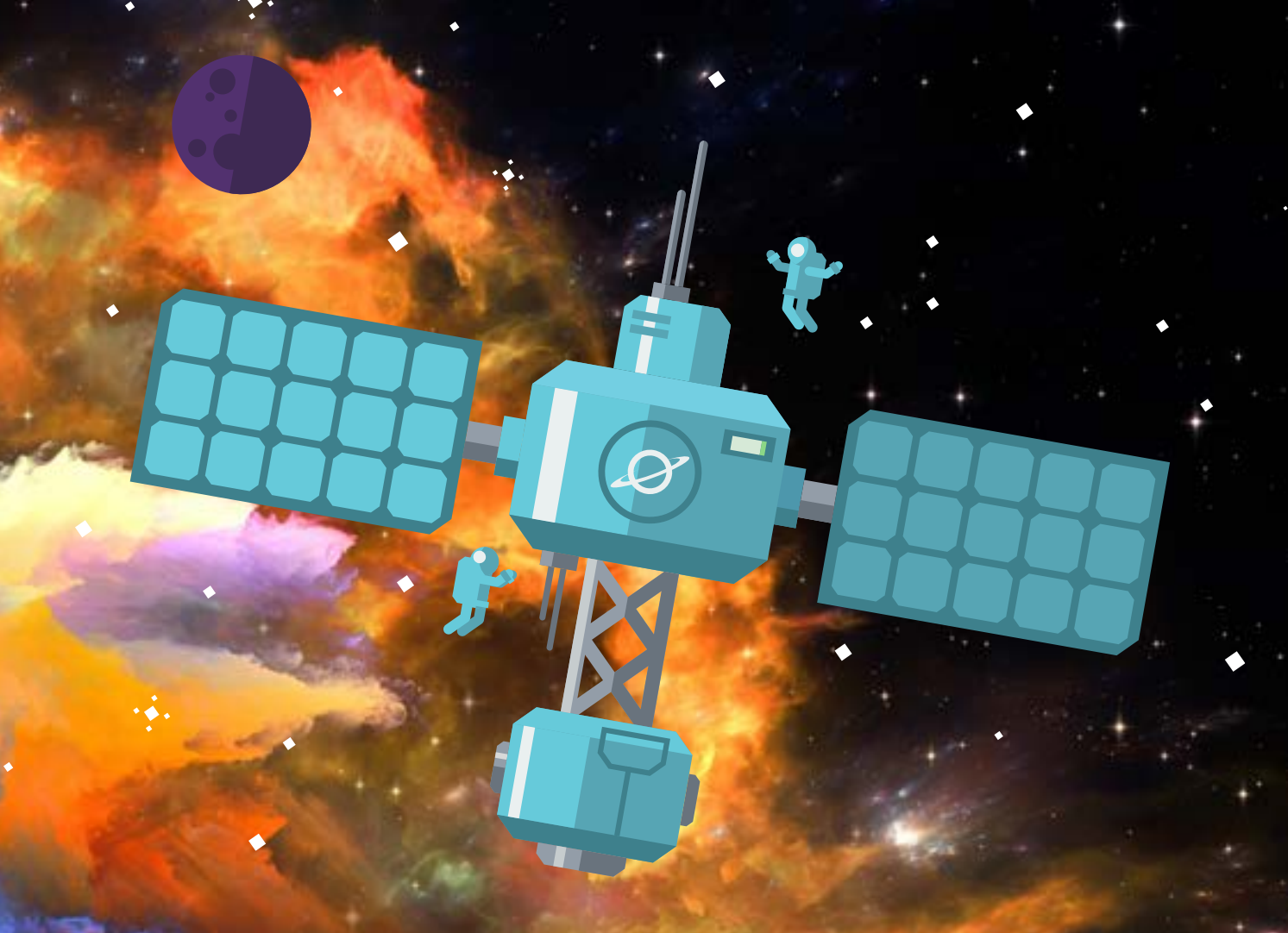
26 MARCH

Join us for a day of prehistoric fun family activities. Make your own pair of dino-feet, enjoy some dino stories in our raptor nest, compete in an exciting egg hunt and discover dino fossils. There's even face painting and exciting excavations to boot!

SATURDAY 26 MARCH

10am–4pm | drop-in  
£3.50, under 5s free

WORKSHOP		WORKSHOP		SHOW	
AGES 5+	<p><b>DINO STARS</b> An interactive, hands-on workshop with some of Dinostar's fascinating collection of dinosaur exhibits. You'll get an opportunity to hear about dinosaurs including Triceratops and Tyrannosaurus rex and then study replica and genuine dinosaur fossils at close quarters. The workshop features dinosaur teeth, claws, bones, and even dinosaur eggs! <b>Steve Plater</b>, owner of the Dinostar dinosaur museum based in Hull, will be your guide in this hands-on dinosaur experience. Ticket includes entry to <i>Dino Day</i> activities.</p>	AGES 8+	<p><b>PAPER CIRCUITS</b> Learn the basics of electronics as you build circuits using only paper, scissors and copper tape. You'll also have the opportunity to use your new skills to create a great-looking light-up card with LEDs.</p>	AGES 8+	<p><b>MURDEROUS MATHS WITH KJARTAN POSKITT</b> Author of the <i>Murderous Maths</i> books Kjartan Poskitt introduces you to the people who really did put the murder into maths! He'll also be showing off some amazing tricks and weird facts including how to make a dragon from a cinema ticket... But no nasty sums, guaranteed! <i>'A stand-up maths routine has children and teachers in fits of laughter...'</i> The Times Educational Supplement</p>
10am–3pm (hourly, not 1pm)   45 mins		11am   90 mins		12.30pm and 2.30pm   1 hour	
£4   Basement Gallery 4		also on Saturday 9 April		£6, family ticket £20 (4 tickets)	
Presented by Dinostar		£10   Hacklab		Dissection Room	
		Presented by Edinburgh Hacklab		Presented by Scholastic Publishing	



FILM



AGES 5+

**DOUBLE DOME NIGHTS**

Settle back in a comfortable seat for a real full dome cinematic treat. Each night we'll be showing a combination of two 30-minute films including a chance to see *From the Earth to the Universe*, the new planetarium experience from the European Southern Observatory, on selected dates. Films are suitable for everyone aged 5+, visit [dynamicearth.co.uk](http://dynamicearth.co.uk) for full programme information.

Tuesday 29, Wednesday 30 March,  
Tuesday 5 and Wednesday 6 April  
5.30pm | 90 mins  
£5 adult, £3 child, Explorer Pass holders free  
ShowDome

ACTIVITY



AGES 5+

**DESTINATION SPACE: LIFE IN SPACE**

Do you have what it takes to become an astronaut? Join us to find out. Astronauts must train for years to be ready to live and work in space and the hard work doesn't stop when they get there. Take part in our astronaut challenges and discover some of the gruesome but fascinating things that can happen to the human body when we leave planet Earth behind.

Friday 1 and Friday 8 April  
10am-4pm | drop-in  
Free with admission | Stratosphere

ACTIVITY



AGES 5+

**DESTINATION SPACE: ROCKETS**

Just like British Astronaut Tim Peake, every astronaut needs a rocket to get them into space. Real rockets must travel at incredible speeds and with phenomenal power just to escape the surface of our planet. Explore rocket science throughout the day with our interactive activities and demonstrations, learning about some of the amazingly simple science that makes space flight possible. You'll even be able to make your own rocket to take away!

Monday 4-Tuesday 5 April  
10am-4pm | drop-in  
Free with admission | Stratosphere

ACTIVITY



AGES 5+

**CELLS, MICROSCOPES & ART**

Come along to our drop-in microscope activities with scientists from Heriot Watt University to discover the amazing tiny world. You'll also find out how lasers and a billion years of marine evolution have helped to accelerate our understanding of tiny things. You can even join in using your phone and create some spectacular science-inspired 3D art and light projections!

Thursday 7 April  
10am-4pm | drop-in  
Free | Stratosphere

# AROUND EDINBURGH



ACTIVITY

ALLAGES

## STREET SCIENCE

With mind-boggling experiments and dazzling science demonstrations, our busking bikes take street performance to a whole new level. Witness explosions, weirdness and plenty of mess. Look out for our *Street Science* team around town during the Science Festival and follow us on Twitter @EdSciFest for real-time Street Science updates.



ACTIVITY

ALLAGES

## BIRD PEOPLE

Come and explore the forces of flight in the uplifting *Bird People* science show with medieval would-be aviator and alchemist John Damian. Then use what you discover to compete in our family technical challenge.



SHOW

ALLAGES

## CAPTAIN FLAP FLIES FORTH

Captain Flap has crash landed his plane, Puffin One! He needs to learn the principles of flight so that he can repair his plane and re-programme his computer. Why did the plane crash? Does he need to redesign the wing or consider using a different type of fuel? Join him for this interactive science show and explore what can be learned from how birds fly so that he can finally make it home. Other interactive activities on throughout the week.

Saturday 12 March–Sunday 10 April  
drop-in

Free

Supported by the Institute of Physics in Scotland, the Royal Society of Chemistry and Viridor

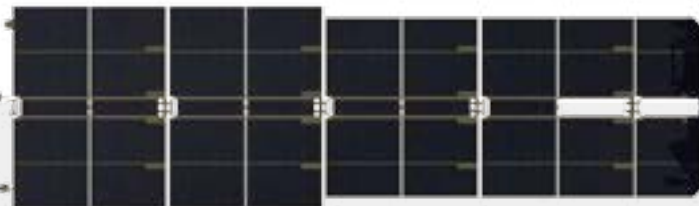
Friday 25 March–Sunday 10 April  
12pm–4pm | drop-in

Free with admission | National Museum of Flight

Friday 25 March–Sunday 10 April  
(Friday, Saturday and Sunday only)

2pm | 50 mins

Free with admission  
Scottish Seabird Centre | Wildlife Theatre



ACTIVITY



AGES 9+

## SO YOU WANT TO BE A SURGEON?

Join the doctors at Surgeons' Hall Museums for a fun, hands-on workshop exploring the exciting world of surgery. Learn about the body and try out the amazing techniques used to train surgeons. How steady are your hands? Do you think you have what it takes to save a life? Find out in this event that's fun for all the family.

SHOW

# THE SOUNDS OF SCIENCE

AGES 8+

Launching at the Science Festival, this extraordinary project reveals how humans have changed the world over the last 10,000 years through a timeline of science and engineering played live using nothing more than sound. Celebrated percussionist Dame Evelyn Glennie will perform the world premier of a groundbreaking 21-minute soundscape written by composer Jill Jarman and conceived by timeline specialist and world history author Christopher Lloyd and a discussion about the project will follow. With generous support from the Institution of Mechanical Engineers.



Tuesday 29, Thursday 31 March,  
Tuesday 5 and Thursday 7 April  
11am, 1pm and 3pm | 1 hour

£3.50 per child (adults go free with child)  
Surgeons' Hall Museums

Wednesday 30 March

7pm | 105 mins  
£15 adult, £9 child, £40 family ticket (2 adult, 2 child)

The Queen's Hall

Image: Philipp Rathmer



SHOW



AGES 8+

### FIRST WORLD WAR LIVING HISTORY

Come and meet our First World War re-enactors **Ailsa** and **Dave Clarke** as they assume the roles of a Scottish Women's Hospital nurse and a soldier, using real-life artefacts from 1914. Trench warfare and medical triage come to life as they talk about the development of technology and medicine through the war. Then you get in on the action, taking on the role of a triage nurse and making critical life and death decisions on who to treat first and how.

Saturday 26 March, Saturday 2 and Saturday 9 April  
11am–4pm | drop-in  
Free | The Scottish Parliament

WORKSHOP



AGES 8+

### SFX BLOOD AND GORE MAKE-UP

A rare chance to get involved with the Metamorphose *SFX Blood and Gore Make-Up* workshop, where you can learn how the film and theatrical worlds make their fake effects look real! This workshop will show you how to create the ultimate in blood and gore effects such as seeping wounds, limb clawed by an animal or a crushed finger effect. Warning: Don't wear your favourite T-shirt, things will get a little messy.

Saturday 26 March, Saturday 2 and Saturday 9 April  
10am–12pm and 1pm–4pm | drop-in  
Free | The Scottish Parliament

ACTIVITY



ALL AGES

### MAKING IT

Celebrating the rise of do-it-yourself culture this fun, engaging exhibition is packed with interactive demonstrations of modern design, innovation and technological futures, from 3D scanning to smartphone microscopes. This is your chance to interact with the modern digital design and fabrication tools which are taking the scientific, technological and design worlds by storm.

Saturday 26 March–Sunday 10 April  
10am–5pm | drop-in  
Free | The Centre, Livingston

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



ACTIVITY



AGES 3+

### WILD ABOUT SCOTLAND BUS

Jump on-board the *Wild about Scotland bus*, run by the Royal Zoological Society of Scotland and supported by Clydesdale Bank. Step inside at various locations around Edinburgh to discover the fascinating world of mini-beasts, and how RZSS is working to protect beavers and Scottish wildcats. Go online at [sciencefestival.co.uk](http://sciencefestival.co.uk) for full programme details and to find out about *mini-beast safari* and *crafts to help nature* bookable sessions.

Monday 28 March–Saturday 9 April (not Fridays) | 10am–4pm | drop-in  
Free (ticket required for bookable sessions)  
Dynamic Earth, Edinburgh Zoo, Grassmarket and Summerhall

SPECIAL EVENT

## UPDATES FROM SPACE

AGES 7+

Meet one of Europe's most experienced space explorers to get an insight into life as an astronaut. European Space Agency's (ESA) **Jean-François Clervoy** will share his experiences of 675 hours of space flight. Learn about training to be an astronaut, what's involved in a space mission and why Jean-François took a Rubik's Cube on every space trip.

Jean-François is part of the team working with British ESA astronaut Tim Peake on his Principia Mission. Tim blasted off from Earth to join the ISS on 15 December 2015 and Jean-François with guests from UK Space Agency will share the latest news on Tim's mission.

Thursday 31 March | 5.30pm | £11/£9, £7 child, £30 family ticket (2 adult, 2 child) | The Queen's Hall  
With thanks to UK Space Agency and ESA

WORKSHOP



AGES 6+

### SYMMETRIES IN LIGHT: THE ART AND SCIENCE OF THE KALEIDOSCOPE

Explore colour, shape and light through the lens of a kaleidoscope! Find out more about how a kaleidoscope works, its principles, construction and optics, while building your very own model to take home. Join us for this fun, instructive family event. Find out more about the *Symmetries in Light* exhibition on p.50 and visit the exhibition from Thursday 7–Sunday 10 April for the chance to also enjoy activities from the university's *SCI Fun Roadshow*, see p.25 for details.

Monday 4, Thursday 7 and Saturday 9 April  
11am and 2pm | 40 mins  
£5 | Playfair Library  
Presented by The University of Edinburgh

SPECIAL EVENT



ALL AGES

### THE JUPITER ARTLAND MINECRAFT EXPERIENCE

There's treasure hidden throughout Jupiter Artland, can you be the first to find it all? This co-operative treasure hunt is conducted simultaneously in the real world and in *Minecraft*. Work as a team to guide each other through the hunt, using a smartphone app to collect beacons and uncover stories and characters from Scottish legends as you take part in the adventure.

Tuesday 5 April  
10am and 2pm | 90 mins  
£5 | Jupiter Artland

ACTIVITY



AGES 5+

### PRINTING 3D ORGANS

Anything seems possible with 3D printing nowadays, but can we really print body parts as well? Come along and talk to a team of bio-scientists from Heriot-Watt University about what they can do with their ground breaking 3D printer. Find out how a specialised process using human stem cells could pave the way to purpose built replacement organs for patients; eliminating the need for organ donation, immune suppression and the problem of transplant rejection.

Saturday 9 April | 1pm–4pm | drop-in  
Free | The Scottish Parliament



# BOOK YOUR TICKET TO A BETTER WORLD

In 2016 we're venturing forth to explore possible brave new worlds and science, technology, engineering and design's ability to help improve our lives. There are now more than 7 billion people on our planet and if we are to share a sustainable future we must figure out how we can build a better world not only for our children and grandchildren but for ourselves.

Through a vibrant and varied programme of events, exhibitions and happenings, we are exploring everything from the personal to the political, the microscopic to the cosmic, and the natural to the synthetic. You'll voyage through our planetary system of ideas and together we'll discover if a better world is here and now, just beyond our reach or on another planet.

We'll discover what it means to be human, from the bacteria in your gut to the possibility of artificial intelligence; look at our environment and the buildings we inhabit; sample the science of food and drink and look to the future of space travel.

Join us on this voyage of discovery...

## PROGRAMME STRANDS

**Being Human** – Improving our lives through better health, well-being and understanding of the human condition.

**Our Built Environment** – Exploring how science is impacting on our homes and cities, helping us to live well in an increasingly urbanised world.

**Science and Culture** – Championing science's role in culture through people, policies and politics.

**A Planetary Perspective** – Planet Earth faces some big challenges and science has a role to play in combatting many of these and helping to ensure environmental sustainability.

**Beyond Planet Earth** – Exploration of non-Earthbound challenges and opportunities.

**GastroFest** – A mini festival of food and drink... And science!

**The Reading Experiment** – Uniting the worlds of science and words.

Look out for the programme strand tags on our event listings and search by strand on our website: [sciencefestival.co.uk](http://sciencefestival.co.uk).

## JOIN THE CONVERSATION

Share your ideas with us! 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, the centre of our universe, where you'll find a huge variety of innovative and interactive events and exhibitions, a pop-up science bookstore from Blackwell's in the courtyard chalet and plenty of scientists and artists to mingle with over a drink in The Royal Dick bar.

## 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 our Mars Master Constructors big build (p.20) allowing you to add to the Mars colony with LEGO® brick builds.



## EXPERIMENT

Take part in some real science experiments during this year's events. *Barney's Beer – The Taste Test 2016* invites visitors to sample a new Barney's Beer brewed especially for Science Festival 2016. Barney has worked with Prof Charles Spence to create *The Taste Test* experiment which is a delicious way to make a scientific contribution. Look out for our pop-up taste tests from Barney's Beer at various Science Festival events throughout the Festival.

## EARLY BIRD TICKET OFFER

Buy 4 tickets for adult events and receive your 5th ticket free! Cheapest ticket free, valid for five separate events only. Early Bird tickets can be booked by phone or in person. Offer closes on Saturday 19 March.

## AGE RESTRICTIONS

The adult 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 are marked with AGES 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.



FIG 1. SCIPALS MARIE CURIE AND NIKOLA TESLA DEMONSTRATE A SUCCESSFUL SCI-FIVE!

## #SCIPALS

Students! Are you sci-curious? Let's be #SciPals! Half price student tickets are available for most Science Festival events – enjoy a lunchtime talk for just £3 or an evening out for as little as £4.25. Sign up to our students mailing list [sciencefestival.co.uk/students](http://sciencefestival.co.uk/students) or follow @EdSciFest for special offers, news and jobs. Not valid on every event, see individual entries for price information. Advance booking is recommended as half price tickets are subject to availability.

## SIEMENS

Siemens support Edinburgh International Science Festival as part of the Curiosity Project; a three-year engagement programme that brings science, technology, engineering and mathematics (STEM) to life for young people. The UK needs to double the number of engineers entering the industry, so by supporting organisations that reach out and nurture the innate curiosity in young people, we hope to help reduce this shortage.

The project is underpinned by an extensive education portfolio providing free, stimulating and unique resources for teachers, parents and young people, that bring STEM education to life at home and in the classroom. Find out more at [siemens.co.uk/curiosity-project](http://siemens.co.uk/curiosity-project).

## THROUGHOUT THE FESTIVAL

EXHIBITION



### EXCHANGE

Sometimes two very different things can work together in surprising ways. Discover how the two organisms that make up lichens, algae and fungi, share their abilities to enhance their lives and ours. Take a closer look at lichens that can be found on your doorstep and see beautiful brooches by **Kate Bajic** inspired by lichens and their chemistry.

6 February–15 May | 10am–5.45pm  
(10am–4.45pm in February)  
Free | Royal Botanic Garden Edinburgh  
Gateway Gallery

EXHIBITION



### BRITISH ART SHOW 8

This exhibition focuses on how objects are being rethought: whether transformed by technology or expressing new ideas about materiality in light of the virtual world. Featuring works of art that use new technologies alongside more traditional forms of art, it offers a diverse reflection of our contemporary world and examples of how scientific ideas can be used creatively to reimagine our place within it. *British Art Show 8* brings together the work of 42 artists made in the last five years and is organised by Hayward Touring.

Saturday 13 February–Sunday 8 May  
Opening times vary | drop-in  
Free | Inverleith House, Scottish National  
Gallery of Modern Art and Talbot Rice Gallery

Image: Imogen Stidworthy, *A Crack in the Light* (film still), 2013 © the artist. Courtesy the artist, Matt's Gallery, London and AKINCI, Amsterdam

EXHIBITION



### NATURE MOTHER OF INVENTION

Many of the world's greatest inventions combine human intellect with inspiration from nature. This new exhibition shows how one tropical plant family, the Sapotaceae, has contributed to a wide variety of useful creations from golf balls and telecommunication cables connecting continents to miracle sweeteners.

Saturday 19 March–Sunday 24 July  
10am–5.45pm | drop-in  
Free | Royal Botanic Garden Edinburgh  
John Hope Gateway

# SCIENCE FESTIVAL LATES

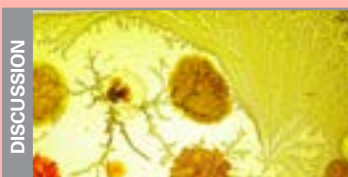


**AGES 18+ | SPECIAL EVENT**  
 Want to build and program a LEGO® brick goalkeeper? Or remove a blood clot from a brain in A&E? *Science Festival Lates* is the event for you as we turn our flagship children's venue over to adults for one very special night. We've got brains, bees, circuits and slime mixed in with music, drinks and fun. Don't miss the chance to get hands-on and get your geek on; come join the party!

THURSDAY  
 24 MARCH

7.30pm | 3 hours  
 £11/£9 | City Art Centre  
 Supported by

**Marks&Clerk**  
 Intellectual Property Services



SATURDAY  
 26 MARCH

## MENAGERIE OF MICROBES

Join the *Menagerie of Microbes* team of artists and scientists for a day of interdisciplinary workshops, talks and discussions exploring the mechanisms, histories and future potential of simple yet complex life forms. Beginning the day with an hour of free exhibitor talks, the afternoon will follow with a series of three 90 minute workshops. Sign up to each individually or join us for the full day. The workshops include creating textiles with microbial dyes with **Anna Dumitriu**, a micro-geography field study with **Simon Park**, and testing the intelligence of slime mould with **Heather Barnett**

Talks: 11am | 1 hour  
 Free | Summerhall | Anatomy Lecture Theatre  
 Workshop: 1pm, 3pm and 5pm | 90 mins  
 £12 each or 3 for £30 | Summerhall | ASCUS Lab  
 Presented by ASCUS Art & Science  
 Crystallised Bacteria © Simon Park

## BEING HUMAN

### IS MY IMMUNE SYSTEM NORMAL?

Feel like you're going from one cold to the next? Over the winter it may seem like that, but does that mean there is something wrong with us? Join immunologists **Arne Akbar**, **Sarah Goddard** and **Rick Maisels** as we explore how the immune system works and what effect factors like age, stress, exposure to microbes and genes have on our immune systems. Together we'll try to get to the bottom of what normal is.

12.30pm | 1 hour  
 £6/#SciPals students £3  
 National Museum of Scotland | Auditorium  
 Presented by the British Society for Immunology

### GO HOME AND SIT STILL: THE SCOTTISH WOMEN'S HOSPITALS IN THE FIRST WORLD WAR

A fascinating talk about the Edinburgh-born pioneer Dr Elsie Inglis. In 1914 she offered the War Office a female staffed hospital unit and was told to 'go home and sit still'... She didn't. Instead, Dr Inglis established the Scottish Women's Hospitals. **Christine Short** tells the story of this remarkable women who braved deprivation, disease and war to provide a high standard of nursing care during the First World War.

2pm | 1 hour  
 Free (ticket required)  
 The Scottish Parliament | Education Room

EXHIBITION



### BIO AND BEYOND

Co-curated by the Science Festival, Summerhall and ASCUS Art & Science, *Bio and Beyond* brings together work from local and international artists inspired by or challenging science and technology's potential to improve our world and how we live in it. Life is put under the microscope; encompassing everything from the deeply personal to the truly global – even cosmic.

Dennis & Debbie Club, Fiona Anderson, Lewis Den Hertog and Kieran Curran (aka MCTRUE FACTS) explore the utopian and dystopian possibilities of life on Earth and beyond in group exhibition *The Human's Planet Earth*, while printmaker Ade Adesina comments on ecology and our ever-changing landscape in *There Will be Light*. Heather Dewey-Hagborg's *Stranger Visions* uses found DNA to produce 3D portraits, and Trevor Gordon & Josie Vallely present artworks on the theme of 'living with eczema' in *Atopic Art*. Artists, designers and scientists Heather Barnett, Anna Dumitriu, ecoLogicStudio, Patrick Hickey, Simon Park, Sarah Roberts and the ASCUS Lab present a *Menagerie of Microbes*, exploring the biological mastery of simple yet complex life forms.

**ASCUS Lab:** Are you a scientist interested in art? An artist interested in science? Or are you interested in both fields and curious about how they intersect? ASCUS Lab is a community space for experimentation in art and science, bringing a programme of hands-on lab-based activities, talks, taster sessions and more to the Science Festival. See [ascus.org.uk/ascus-lab](http://ascus.org.uk/ascus-lab) for full listings.

FRIDAY  
25 MARCH

Saturday 26 March–Friday 13 May | 11am–6pm  
drop-in | Free | Throughout Summerhall  
EXHIBITION LAUNCH: Friday 25 March | 7pm–9pm | Free  
ASCUS LAB: Saturday 26 March–Friday 13 May | Opening times vary | drop-in | Free

In association with Summerhall and ASCUS Art & Science  
Artwork: Heather Dewey-Hagborg, Wall of Faces

DISCUSSION



### ADVENTURES IN THE ANTHROPOCENE WITH GAIA VINCE

Join Gaia Vince for an adventure into the planet we made, as she talks about her award winning book *Adventures in the Anthropocene* with the *Guardian's* Books Editor Claire Armistead. Humans have become a force on a par with earth-shattering asteroids or planet-cloaking volcanoes and our planet is said to be crossing a geological boundary into the Anthropocene, or Age of Man. Gaia looks at how humanity's changes are reshaping our living planet and explores how we might engineer Earth for our future.

READING EXPERIMENT | A PLANETARY PERSPECTIVE

DISCUSSION



### PLAYFUL CITIES

In the past play was rarely thought of as an activity for adults, however this is changing as science reveals how important it is for our minds. Pervasive Media Studio Producer Verity McIntosh will discuss the annual Playable City award. She will be joined by Donald Gow, Senior Zoo Keeper and expert in primate play at Edinburgh Zoo, Dr Tine Bech, play researcher and artist, and Dr Amanda Seed, lecturer in psychology and neuroscience in an event hosted by Francesca Perry, social and community editor for *Guardian Cities*. There will also be the chance for some play!

OUR BUILT ENVIRONMENT

SPECIAL EVENT



### ELECTRONIC DREAMS

Do you remember the ZX Spectrum? Maybe you were more of a dedicated BASIC fan? Or did you see the Acorn Electron as the future? For anyone who was a kid in the 1980s, these iconic computer brands are the stuff of legend. Join historian of science Tom Lean, author of *Electronic Dreams*, to look back at how Britain embraced the home computer and at the people who drove the boom, and have a go on a selection of machines provided by Edinburgh Retro PC.

READING EXPERIMENT | SCIENCE AND CULTURE

SPECIAL EVENT



### CASKS, COATS AND CHEMISTRY

Join us for a unique interwoven story of textiles, whisky and science. Ewan Henderson of Scotch Broth Events and textile specialist Alan Moore of ten30 will take you on a journey through taste and style as they experiment with the flavours and aromas that connect food, drink and fashion as they explore cask chemistry and even dissect a jacket. Sit back, relax and absorb the story as you sample whisky and canapés paired at a molecular level in this multi-sensory event.

AGES 18+ | GASTROFEST

3pm | 90 mins  
£8.50/£6.50/#SciPals students £4.25  
National Museum of Scotland | Auditorium  
Presented by the Royal Society

5.30pm | 90 mins  
£8.50/£6.50/#SciPals students £4.25  
Summerhall | Main Hall  
Our Built Environment events are supported by Scotland's Year of Innovation, Architecture and Design

8pm | 90 mins  
£8.50/£6.50/#SciPals students £4.25  
Summerhall | Main Hall  
In association with Bloomsbury Publishing

8pm | 2 hours  
£27.50 (includes drinks and canapés)  
Summerhall | Dissection Room

# SUNDAY 27 MARCH



DISCUSSION

A PLANETARY PERSPECTIVE

READING EXPERIMENT

## THE PLANET REMADE: HOW GEOENGINEERING COULD CHANGE THE WORLD

Carbon dioxide emissions are still rising and, as new scientific research suggests that no feasible reduction can now effectively mitigate climate change, an increasingly influential minority of climate scientists are exploring the possibility of human intervention in the biosphere. In this fascinating discussion **Oliver Morton** will offer an insightful, accessible and critical look at the climate change debate, providing the reasons for a new and controversial response: geoengineering.

12.30pm | 90 mins  
**£8.50/£6.50/#SciPals students £4.25**  
 National Museum of Scotland | Auditorium  
 In association with Granta Books  
 A Planetary Perspective events are supported by Greener Scotland



DISCUSSION

OUR BUILT ENVIRONMENT

## A ZERO CARBON WORLD

By 2050, the UK government aims to reduce greenhouse gas emissions by 80% from 1990's figure. A building's energy usage must be considered, but should we also look at the environmental cost of creating new buildings in the first place? Join **Dr Kate Carter**, senior lecturer in Architecture, Technology and Environment, **Prof John Currie** from the Scottish Energy Centre at Edinburgh Napier University and **Andrew Waugh**, the architect behind some of the world's tallest wooden skyscrapers, as they turn the spotlight on zero carbon buildings.

3pm | 90 mins  
**£8.50/£6.50/#SciPals students £4.25**  
 National Museum of Scotland | Auditorium  
 Supported by



DISCUSSION

BEYOND PLANET EARTH

## DIY SPACE EXPLORATION

A democratisation of space exploration is underway! From Space X and Virgin Galactic to the *Solar Impulse* plane, private organisations have made many recent innovations and we're now in an exciting era where individuals can 3D-print rocket parts and launch their own microsatellites. Join us for an evening exploring the surprisingly reachable areas of space with **Dr Camilla Colombo**, lecturer in spacecraft engineering at Southampton University, **Tom Walkinshaw** of Alba Orbital and Head of ESA's Space Debris Office **Dr Holger Krag**.

5.30pm | 90 mins  
**£8.50/£6.50/#SciPals students £4.25**  
 Summerhall | Anatomy Lecture Theatre



DISCUSSION

BEYOND PLANET EARTH

READING EXPERIMENT

## A VERY SHORT INTRODUCTION TO... STARS

Every atom of our bodies has once been part of a star. Join **Andrew King**, Professor of Astrophysics, as he explains how understanding the stars is key to understanding the galaxies they inhabit, and thus the history of our entire Universe. Andrew presents a fascinating introduction to the science of stars, from the mechanisms that allow stars to form and the processes that allow them to shine, as well as the results of their inevitable death.

1pm | 1 hour  
**£6/#SciPals students £3** | Summerhall  
 Anatomy Lecture Theatre  
 Presented by Oxford University Press



ACTIVITY

OUR BUILT ENVIRONMENT

## WIKIHOUSE DEMONSTRATION BUILD

See how easy it is to build a house with no power tools! Join members from Fountainbridge Canalside Initiative, who built the UK's first community WikiHouse, and have a go! WikiHouse is an open source building system with many designers collaborating to make it simple for everyone to design, print and assemble beautiful, low-energy homes. Come along and see just how easy it is by taking part in our mini build.

1pm and 3pm | 90 mins  
**Free (ticket required)** | Summerhall  
 Courtyard  
 Presented by the Fountainbridge Canalside Initiative



DISCUSSION

OUR BUILT ENVIRONMENT

## 'FLATPACK' IN FOUNTAINBRIDGE

WikiHouse is an open source system that is making amateurs feel empowered to experiment with architecture. It makes it possible for anyone to design, share, download and 'print' houses that can reduce waste, be low-cost, and suited to local needs. Find out the story behind this remarkable movement with WikiHouse co-founder **Alastair Parvin** and **Akiko Kobayash** from FCI who built the first UK community WikiHouse in Fountainbridge, Edinburgh over 3 days last October.

5.30pm | 1 hour  
**£8.50/£6.50/#SciPals students £4.25**  
 Summerhall | Main Hall  
 Presented by the Fountainbridge Canalside Initiative

# MONDAY 28 MARCH

SPECIAL EVENT



BEING HUMAN

## LET'S REDESIGN THE WORLD, AND DANCE

Imagine a world where dancing had the same status as medicine, and where public places to dance were as numerous as bars, restaurants and parks. Dr Peter Lovatt proposes that in such a world people would be healthier, happier, smarter and more socially engaged. Drawing on the work of the Dance Psychology Lab at the University of Hertfordshire, Peter demonstrates how dancing can form part of an effective health and well-being programme, boost our mood, sharpen our thoughts and help us bond socially.

5.30pm | 90 mins

£11/£9 | Summerhall | Dissection Room

WORKSHOP



BEING HUMAN

## BODY OF ART - ANATOMY CANVAS

Be your own canvas and get to grips with the anatomy of your own body! In this hands-on workshop, you'll be taught the basics of anatomy and then have the chance to paint these structures onto yourself or each other. The activities are suitable for beginners as we'll start with a demonstration of basic techniques so that everyone feels confident enough to give body painting a try. Materials are provided and photography is encouraged.

6pm | 90 mins

£10 | Summerhall | Basement Gallery 4

Presented by Avid Anatomy



**STUDENTS**  
ARE YOU SCI-CURIOUS?  
LET'S BE #SCIPALS!  
FOLLOW @EDSCIFEST FOR  
½ PRICE TICKETS, NEWS,  
JOBS & SPECIAL OFFERS

FIG 1. SCIPALS MARIE CURIE AND NIKOLA TESLA DEMONSTRATE A SUCCESSFUL SCI-FIVE!

ADULT EVENTS

WORKSHOP



## 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.

7pm | 90 mins

also on Wednesday 6 April

£15 | Summerhall | Hacklab

Presented by Edinburgh Hacklab

DISCUSSION



## AT THE FRINGE OF REASON: SKEPTICS IN THE PUB

Edinburgh Skeptics head back to the pub for a series of events during Science Festival 2016. Join them as they investigate a range of topics relating to science, reason and critical thinking including GMOs, genders, materials of tomorrow, psychic cons, syphilis, the biology of crime, big data and Big Brother and happiness. See [edskeptics.co.uk](http://edskeptics.co.uk) for full programme information.

7.30pm | 2 hours

on until Thursday 31 March and from Monday 4–Thursday 7 April

Free | The Banshee Labyrinth

Presented by Edinburgh Skeptics

EXHIBITION



BEYOND PLANET EARTH

## CELEBRATING KEVIN GOVENDER AND THE INTERNATIONAL ASTRONOMICAL UNION

The 2016 Edinburgh Medal has jointly been awarded to the International Astronomical Union and Kevin Govender for the creation and practical establishment of *Astronomy for Development*, which integrates the pursuit of scientific knowledge with social development for and with those most in need and has successfully harnessed astronomy in the service of education and capacity building in the developing world. Come and view an exhibition celebrating the work of Kevin Govender and the International Astronomical Union.

Opening times vary | drop-in on until Friday 8 April

Free | National Library of Scotland

Presented by National Library of Scotland

SPECIAL EVENT



BEING HUMAN

## EXPERIMENTAL: THE SHOW THAT PLAYS WITH YOUR MIND

Prof Richard Wiseman returns to the Festival with *Experimental*. An interactive experience like no other as you take part in live mind-blowing psychology experiments that will make you laugh, scream and gasp. There's no performer. It's just you and the unknown. Devised and presented by Prof Richard Wiseman.

8pm | 50 mins

£8.50/£6.50

Summerhall | Dissection Room

# TUESDAY 29 MARCH



DISCUSSION

READING EXPERIMENT | A PLANETARY PERSPECTIVE

## A VERY SHORT INTRODUCTION TO... MOUNTAINS

Mountains cover a quarter of the Earth's land and are central to our ecosystems. They are the sources of all the world's major rivers, affect regional weather patterns, hold deposits of minerals, and provide both active and contemplative recreation. Yet mountains are also significantly affected by climate change. In this event, **Prof Martin Price** outlines why mountains matter and addresses the existing and likely impacts of climate change on mountain, hydrological and ecological systems.

1pm | 1 hour  
£6/#SciPals students £3 | Summerhall  
Anatomy Lecture Theatre  
Presented by Oxford University Press



DISCUSSION

BEING HUMAN

## SURVIVAL OF THE CENTURY WITH MARTIN REES

Join us for an evening with **Lord Martin Rees**. Astronomer Royal and a Fellow of Trinity College Cambridge, and former President of the Royal Society, Lord Rees will be discussing how we can survive the century and exploring risks that threaten our very existence as well as shedding some light on the cutting edge research underway at his new research centre.

5.30pm | 90 mins  
£8.50/£6.50/#SciPals students £4.25  
National Museum of Scotland | Auditorium  
Supported by

**SIEMENS**



DISCUSSION

BEING HUMAN

## IN NEED OF SUNSHINE

Research has highlighted lots of reasons why sunshine is important, but how does it help our health? How much do we need? And what's the role of vitamin D? These questions and more will be discussed by our panel including local GP and avid vitamin D campaigner **Dr Helga Rhein**, dermatologist **Dr Richard Weller** and other experts talking about the links between the sun and multiple sclerosis and our emotional well being.

5.30pm | 90 mins  
£8.50/£6.50/#SciPals students £4.25  
Summerhall | Anatomy Lecture Theatre



DISCUSSION

READING EXPERIMENT | BEING HUMAN

## LIFE LESSONS

Birth cohort studies are a British speciality. These ambitious pieces of research reveal how our childhood impacts the course of our lives, and the many factors that influence our economic, social and personal development. **Helen Pearson**, editor for *Nature* and author of the forthcoming *The Life Project*, director of CLOSER **Prof Alison Park**, **Prof Chris Dibben**, and **Dr George Ploubidis**, Chief Statistician at the Centre for Longitudinal Studies, discuss these observational studies.

8pm | 90 mins  
£8.50/£6.50/#SciPals students £4.25  
Summerhall | Main Hall



DISCUSSION

BEING HUMAN

## WHO WANTS TO BE MULTILINGUAL?

Fingers on buzzers! This pub quiz with a difference will take you on a tour inside a language learner's brain with fun trivia and mind-boggling teasers, curated and delivered by stand-up comic **Susan Morrison** aided by our resident experts **Prof Antonella Sorace** and **Dr Thomas Bak** from The University of Edinburgh. Whether you're a lifelong bilingual, or struggling to remember your high school French: come and join us to discover something new about languages, and how we learn them.

8pm | 90 mins  
£8.50/£6.50/#SciPals students £4.25  
Summerhall | Anatomy Lecture Theatre  
Presented by Bilingualism Matters, The University of Edinburgh



DISCUSSION

BEING HUMAN

## SMART MEDICINE

With chronic health conditions on the rise and the limited resources of the NHS under increasing strain, what are the implications of the push towards the 'digitally-empowered patient'? And will the UK soon see a revolution in gadget-based personal healthcare? Join former President of the Royal Society of Medicine's Telemedicine and eHealth Section **Charles Lowe**, patient-hacker and innovator **Tim Omer** and medical technology evangelist **Dr Jack Kreindler** to explore the perils and potentials of this movement. Chaired by BBC Scotland Health Correspondent **Eleanor Bradford**.

8pm | 90 mins  
£8.50/£6.50/#SciPals students £4.25  
National Museum of Scotland | Auditorium



SPECIAL EVENT

AGES 18+

GASTROFEST

## ADVENTURES IN VITICULTURE

'*In vino veritas, in aqua sanitas*', 'in wine there is truth, in water there is health'; a thought with which to start our exploration of the world of wine! This event will raise a glass (literally and figuratively) to the wonderful art and science of wine making and challenge some common assumptions: Does expensive wine taste better? Will we ever see vineyards in Scotland? Is there a difference between cork and screw top bottles? Join Scottish vigneron **Christopher Trotter** and other experts in this wine safari.

8pm | 90 mins  
£15 (includes wine samples) | Summerhall  
Dissection Room



SPECIAL EVENT



DISCUSSION



DISCUSSION



OUR BUILT ENVIRONMENT

## GREENING THE CITY

Are cities and the countryside distinct environments, or can we bring the two together? With a proposal to create a 'Leaf Walk' bio-bridge in Edinburgh, we explore urban planning, green innovation and its links with public health. In this event we will bring together **Melissa Sterry**, scientist and futurist; **Pierre Forissier**, director at Biomorphis, the practice designing the Leaf Walk bridge; and **Prof Richard Mitchell**, Professor of Public Health. You will also get the chance to exercise your green fingers.

READING EXPERIMENT | SCIENCE AND CULTURE

## A IS FOR ARSENIC

Agatha Christie, The Queen of Crime, is renowned for the use of poisons in her plots. A staggering variety of compounds were employed to bump off her characters during her long writing career and her scientific accuracy is impressive. **Kathryn Harkup**, author of *A is for Arsenic*, explores the science behind the poisons Christie used and how she sometimes used the symptoms of poisons to give clues to her famous sleuths. Expect cunning clues, red herrings and magnificent moustaches.

## THE SCIENCE OF PANDA BREEDING

Pandas are threatened by extinction in their native region of China so it's ever more important that captive breeding programmes exist. RZSS Edinburgh Zoo has the UK's only giant pandas, Tian Tian and Yang Guang, but to date a panda cub has remained elusive. Join Director of Giant Pandas **Iain Valentine**, alongside RZSS Edinburgh Zoo's in-house expert panda keepers, vets and external partners for a discussion on the science behind panda breeding.

The Banshee Labyrinth 7.30pm | AT THE FRINGE OF REASON: SKEPTICS IN THE PUB See page 39

5.30pm | 90 mins

£8.50/£6.50/#SciPals students £4.25

Summerhall | Dissection Room

*Our Built Environment* events are supported by Scotland's Year of Innovation, Architecture and Design

5.30pm | 90 mins

£8.50/£6.50/#SciPals students £4.25

Summerhall | Main Hall

In association with Bloomsbury Publishing

6.30pm | 2 hours

£8/£6 RZSS members | RZSS Edinburgh Zoo

Budongo Trail

Presented by RZSS Edinburgh Zoo

# OUR BUILT ENVIRONMENT

From the first forest shelters to the Sagrada Familia, humanity has shaped its own environment to an extraordinary degree. The spaces we inhabit have a direct impact on how we feel, think, and behave and, as part of Science Festival 2016, we'll be asking how science, technology, architecture and design can impact on our homes and cities to help us to live well through a special series of events focusing on *Our Built Environment*.

In Scotland's Year of Innovation, Architecture and Design, we're looking at eco-friendly portable living spaces in our *Tiny Homes Village* (p.49), creating a platform for discussion around what turns a simple roof over our heads into somewhere we are happy to call home. Explore the exhibition on The Mound Precinct or join in the debate at *Tiny Home Sweet Home* (p.48).

Stepping up in scale, we'll conduct a site survey of Planet Earth, looking at everything from how we can interact with our cities through play (p.37) to debating the how and why of zero carbon buildings (p.38). We'll be asking if cities and the countryside are really two distinct environments in *Greening the City* (p.41) and bringing the built environment and human happiness together in *Healthy, Happy Cities* (p.54).

Look out for events tagged with *Our Built Environment* throughout the brochure and on our website: [sciencefestival.co.uk](http://sciencefestival.co.uk).

*Our Built Environment* is supported by:



ADULT EVENTS

DISCUSSION



BEING HUMAN

READING EXPERIMENT

### A VERY SHORT INTRODUCTION TO... PSYCHOTHERAPY

Psychotherapy and counselling are now widely available and commonly accessed by people to help overcome emotional and psychological difficulties in their lives. **Prof Tom Burns** and **Eva Burns-Lundgren** trace the development of psychotherapy from its origins in Freud's psychoanalysis to the range of different approaches now available – counselling, cognitive behaviour therapy, mindfulness, group and family therapies, and many more.

DISCUSSION



OUR BUILT ENVIRONMENT

READING EXPERIMENT

### UTOPIAN CITIES: FUTURE DREAMS

Many of the most famous utopian cities in history were never built, but they still influence architecture today. Broadcaster and author of *Villages of Vision* **Gillian Darley** will join expert on utopian cities from Leeds University **Dr Diane Morgan**, architect and author of *Last Futures* **Douglas Murphy**, utopian inspired architect **Kate MacIntosh**, and expert on utopian literature **Dr Matthew Beaumont** to discuss how utopian cities continue to shape our built environment.

DISCUSSION



A PLANETARY PERSPECTIVE

READING EXPERIMENT

### DIVESTMENT - DOES IT WORK?

Many organisations and institutions invest large amounts of money in stocks as a way of generating income. There have been calls for some of them to remove the capital they have invested in fossil fuel companies, but is divestment a powerful tool or just a meaningless gesture? We bring together a panel, including **Dave Gorman**, Director of Social Responsibility and Sustainability at The University of Edinburgh, and management scholar **Prof Timothy Devinney** to discuss these contentious issues.

## WEDNESDAY

### 30 MARCH

1pm | 1 hour

£6/**#SciPals students £3** | Summerhall  
Anatomy Lecture Theatre

Presented by Oxford University Press

5.30pm | 90 mins

£8.50/£6.50/**#SciPals students £4.25**  
Summerhall | Anatomy Lecture Theatre

*Our Built Environment* events are supported by Scotland's Year of Innovation, Architecture and Design

5.30pm | 90 mins

£8.50/£6.50/**#SciPals students £4.25**  
National Museum of Scotland | Auditorium

## EDINBURGH MEDAL ADDRESS: ASTRONOMY FOR A BETTER WORLD



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.



The 2016 Edinburgh Medal is jointly awarded to **Kevin Govender** and the International Astronomical Union (IAU), to recognise their wide reaching contribution to science. It is awarded jointly for the creation and practical establishment of *Astronomy for Development*, which integrates the pursuit of scientific knowledge with social development for and with those most in need.



The IAU is an international astronomical organisation which brings together almost 10,000 distinguished astronomers from all nations of the world. Its mission is to promote and safeguard the science of astronomy in all its aspects through international cooperation. Under the pioneering stewardship of Kevin Govender, the Office of Astronomy for Development has successfully harnessed astronomy in the service of education and capacity building in the developing world.

Kevin will be joined by **Silvia Torres-Piembert**, President of the International Astronomical Union, to deliver this year's *Edinburgh Medal Address: Astronomy for a better world*. Oration by **Lord Martin Rees** and vote of thanks by **Prof Monica Grady**.

7pm | 1 hour

£8.50/£6.50/**#SciPals students £4.25**  
City Chambers | Main Chamber

### PREVIOUS MEDAL RECIPIENTS

- 2015 Mary Midgley
- 2014 Prof Mary Abukutsa-Onyango
- 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 Patarroya
- 1993 Prof Wangari Maathai
- 1992 Prof Heinz Wolff
- 1991 Prof Jane Goodall
- 1990 Prof Stephen J Gould
- 1989 Prof Abdus Salam

SPECIAL EVENT



SHOW

BEING HUMAN

## NEURO-YOGA: THE SCIENCE OF YOGA AND MEDITATION

Is yoga all in the mind?

*Neuro-yoga* will bring together experienced yoga and meditation practitioners and experts in neuroscience. This fun, informative and interactive event will combine practical yoga and meditation sessions with a panel discussion between leading neuroscientists who will discuss whether neuroscience can explain the effects that yoga and meditation have on the body and mind. Great for the mind, body and soul!

AGES 8+

SCIENCE AND CULTURE

# THE SOUNDS OF SCIENCE

Launching at the Science Festival, this extraordinary project reveals how humans have changed the world over the last 10,000 years through a timeline of science and engineering played live using nothing more than sound. Celebrated percussionist **Dame Evelyn Glennie** will perform a groundbreaking 21-minute soundscape by composer **Jill Jarman** and conceived by timeline specialist and world history author **Christopher Lloyd** and a discussion about the project will follow. With support from the Institution of Mechanical Engineers.



ADULT EVENTS

5.30pm | 100 mins

£8.50/£6.50/#SciPals students £4.25

Summerhall | Main Hall

7pm | 105 mins

£15 adult, £9 child, £40 family ticket (2 adults, 2 children)

The Queen's Hall

Image: Jim Callaghan

WORKSHOP



## EXTREME SOLDERING

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.

The Banshee Labyrinth 7.30pm AT THE FRINGE OF REASON: SKEPTICS IN THE PUB See page 39

7pm | 90 mins

also on Monday 4 April

£15 | Summerhall | Hacklab

Presented by Edinburgh Hacklab

DISCUSSION



## SORTING THE BEEF FROM THE BULL

Food adulteration, motivated by money, is an issue that has spanned the globe throughout human history. So how do we sort the beef from the bull (or horse, as the case may be)? This event will look into the scientific tools and techniques that have revealed the century's biggest food fraud scams. Leading biogeochemist **Prof Richard Evershed** and science writer **Nicola Temple** will bring this fascinating and under-reported applied science to light.

GASTROFEST  
READING EXPERIMENT

8pm | 90 mins

£8.50/£6.50/#SciPals students £4.25

Summerhall | Anatomy Lecture Theatre

Presented by Bloomsbury Publishing

DISCUSSION



SCIENCE AND CULTURE

## DOLLY AND ME... 20 YEARS WITH THE WORLD'S MOST FAMOUS SHEEP

2016 marks the 20th anniversary of the birth of Dolly the Sheep, the first mammal to be cloned from an adult cell. But what impact did she have on those closest to her and those whose work she inspired? Join us as **Prof Sir Ian Wilmut**, who led the research which created Dolly, and our other expert panellists take your questions and reveal what working with the world's most famous sheep has meant to them. Discover how Dolly still influences cutting-edge scientific research in Edinburgh and beyond.

8pm | 90 mins

£8.50/£6.50/#SciPals students £4.25

National Museum of Scotland | Auditorium

Presented by The Roslin Institute, in collaboration with the MRC Centre for Regenerative Medicine at The University of Edinburgh

DISCUSSION



BEING HUMAN

## TECHNOLOGIES OF THE FUTURE, TODAY

Artificial intelligence is already creeping into our daily lives. Our phones recommend restaurants, and predict our preferences for news, movies, and other content. What is the future at the intersection of machinery and AI? Robots have the potential to change the world, working for us and beside us. Join **James Garforth** and the team from Edinburgh Centre for Robotics as they present a range of robots. What robots might we be interacting with in the future?

8pm | 90 mins

£8.50/£6.50/#SciPals students £4.25

Summerhall | Main Hall

Presented by the Edinburgh Centre for Robotics

WORKSHOP



SCIENCE AND CULTURE

### WEARABLE CIRCUITS

Create your own wearable circuit in this hands-on tech and textiles workshop for beginners. You'll learn some basic electronics and how to design a circuit using LED lights, buzzers and switches and we'll give you as much help as you need with the needlework. Bring along an item of clothing, bag or banner (anything you can sew!) and we'll provide the rest.

DISCUSSION



READING EXPERIMENT

### A VERY SHORT INTRODUCTION TO... FORENSIC SCIENCE

In forensic science, a criminal case can often hinge on a piece of evidence such as a hair, a blood trace, half a footprint, or a tyre mark. In this event, **Prof Jim Fraser** introduces the concept of forensic science and explains how it is used in the investigation of crime. Providing examples from forensic science cases in the UK, US, and other countries, he considers the techniques and challenges faced around the world.

DISCUSSION



### SPOTLIGHT ON: FOSSIL HUNTERS

Newly discovered fossils have led to an exciting breakthrough in recent years, bridging the gap between life in water and life on land. **Nick Fraser**, Keeper of Natural Sciences and curator of current museum exhibition *Fossil Hunters: Unearthing the Mystery of Life on Land*, will tell the story of these fossils and other finds, and what they reveal about how vertebrates colonised the land.

## THURSDAY 31 MARCH

10am and 3pm | 3 hours  
£30 | Summerhall | Basement Gallery 3  
Presented by Remade in Edinburgh

1pm | 1 hour  
£6/#SciPals students £3 | Summerhall  
Anatomy Lecture Theatre  
Presented by Oxford University Press

2pm | 1 hour  
Free (ticket required)  
National Museum of Scotland | Auditorium  
Presented by the National Museum of Scotland

DISCUSSION



BEYOND PLANET EARTH

### THE PLUTO APPRECIATION SOCIETY

In 2006 the number of planets in our solar system was officially reduced. Responding to the discovery of Eris, the International Astronomical Union announced a formal redefinition of the term 'planet'. After a vote it was decided that Pluto was just too small, weird and far away to make the grade. Nine years later, *New Horizons* passed by capturing some incredible images. Join **Prof Iwan Williams**, **Dr Robin Catchpole** and **Prof Monica Grady** as they discuss what the future might hold for this icy dwarf planet.

5.30pm | 90 mins  
£8.50/£6.50/#SciPals students £4.25  
Summerhall | Main Hall

DISCUSSION



A PLANETARY PERSPECTIVE

### NATURAL CONNECTIONS

Do you picture puffins when you go to the supermarket? Did you know your choice of compost could help protect us from climate change? Come and discover why nature is essential to life as we know it and how the choices you make affect the world around you. Prepare to be surprised, intrigued and entertained as our special guests take you through a series of scenarios and challenges which demonstrate how everything is connected!

5.30pm | 1 hour  
£8.50/£6.50/#SciPals students £4.25  
Summerhall | Anatomy Lecture Theatre  
Presented by the Scottish Wildlife Trust  
Image: Steve Gardner

DISCUSSION



A PLANETARY PERSPECTIVE

### CLIMATE FUTURES: A PUBLIC DEBATE

Join us for a panel discussion on a highly significant science topic, Climate Futures. What will happen to future climates? What effects will this have in the UK and globally, and what can or should we do about it? **Prof Dorrik Stow**, Director of the Institute of Petroleum Engineering at Heriot Watt, will chair a panel of leading figures from universities, government, and industrial centres. Together, along with questions from the audience, they will interrogate this significant topic in a Question Time style event.

8pm | 90 mins  
£8.50/£6.50/#SciPals students £4.25  
Summerhall | Anatomy Lecture Theatre  
*A Planetary Perspective* events are supported by Greener Scotland  
Presented by



The Banshee Labyrinth 7.30pm AT THE FRINGE OF REASON: SKEPTICS IN THE PUB See page 39



## UPDATES FROM SPACE WITH JEAN-FRANÇOIS CLERVOY

Join one of Europe's most decorated space explorers to get an insight into life as an astronaut. European Space Agency's (ESA) **Jean-François Clervoy** will share his experiences and highlights of a career involving 675 hours of space flight. He will be joined by guests from the UK Space Agency to update on Tim Peake's Principia Mission to the International Space Station.

Jean-François flew three times on the Space Shuttle. His missions included repairing the Hubble space telescope and undertaking a wide range of science experiments. In his current role Jean-François provides support to the human spaceflight programme and closely followed British ESA astronaut Tim Peake as he trained for his current Principia Mission. Tim blasted off from Earth to join the ISS on 15 December 2015 and the panel will be able to share the latest news on Tim's mission as well as giving a unique viewpoint on the challenges and opportunities of human spaceflight.

5.30 and 8pm | 90 mins

£11/£9, £7 child. £30 family ticket (2 adult, 2 child.) #SciPals students £5.50

The Queen's Hall

With thanks to UK Space Agency and ESA

Family event at 5.30pm see p.33 for more details



## SLIPPING THE MIND

Join us to explore the fragile and fallible nature of human memory, including a look at cutting-edge discoveries on how memories are made and stored, the effects of technology on working memory and the role of nostalgia in making us who we are. Hosted by *Guardian* science writer and neurologist **Jules Montague** with **Prof Giuliana Mazzoni**, **Dr Tim Wildschut** and **Dr Fiona McNab**, this promises to be an unforgettable discussion.

8pm | 90 mins

£8.50/£6.50/#SciPals students £4.25

National Museum of Scotland | Auditorium

Supported by



The British Psychological Society  
Promoting excellence in psychology



## THE FUTURIST MEAL

Throughout history many radical thinkers have attempted to build a better world by overthrowing the conventions of the past to create brand new cultures. One such movement was Futurism, an artistic and social crusade that amongst other things changed our understanding of cooking through the doctrine of bringing the laboratory into the kitchen. **Prof Neil Cox** joins culinary inventor **Charlie Harry Francis** for an experimental Futurist meal. Expect live musical performances, confrontational canapés and disturbing dishes as we go beyond the beyond at this unique event.

8pm | 2 hours

£20 (includes a drink and canapés)

Summerhall | Dissection Room



## HERDING HEMINGWAY'S CATS

In 1935, Ernest Hemingway was given Snowball, a six-toed cat who went on to father a line of moggies bearing this distinctive genetic marker. Scientists now know that the fault driving this profusion of digits lies in a tiny genetic control switch, miles away (in molecular terms) from the gene that 'makes' toes. Drawing on stories ranging from six-toed cats to fish hips, werewolves and zombie genes, geneticist and author **Kat Arney**, in conversation with *Festival of the Spoken Nerds* **Helen Arney** explores how DNA is packed, unpacked and read.

8pm | 90 mins

£8.50/£6.50/#SciPals students £4.25

Summerhall | Main Hall

In association with Bloomsbury Publishing

# FRIDAY 1 APRIL



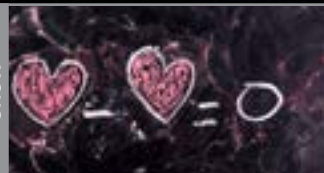
DISCUSSION

READING EXPERIMENT

## A VERY SHORT INTRODUCTION TO... ALGEBRA

Investigate the ABC of  $x+y$  in this accessible introduction to algebra. Algebra marked the beginning of modern mathematics, moving it beyond arithmetic to problems where some quantities are unknown. Join **Peter Higgins**, Professor in Pure Mathematics, as he offers a step-by-step approach for anyone keen on developing their understanding of algebra. Using theory and example, he will reacquaint you with school mathematics, before taking you progressively further and deeper into the subject.

1pm | 1 hour  
**£6/#SciPals students £3** | Summerhall  
 Anatomy Lecture Theatre  
 Presented by Oxford University Press



SHOW

SCIENCE AND CULTURE

## THE MATHEMATICS OF WHY I DON'T HAVE A BOYFRIEND

Are you single? Losing hope that you will ever find 'The One'? Wondering about the true purpose of Venn Diagrams? **Dr Trina Dinnis** gives an introduction to mathematical modelling and how this relates to the real world, using league tables, communication theory, and the novels of Jane Austen.

5.30pm | 1 hour  
**£8.50/£6.50/#SciPals students £4.25**  
 Summerhall | Anatomy Lecture Theatre



DISCUSSION

BEING HUMAN

## WASTE NOT, WANT NOT

We're taking more medicines than ever before, often taken in combination, known as polypharmacy. Most are given to elderly patients and as we're getting older as a society, polypharmacy is becoming more prevalent. **Prof Simon Maxwell**, Professor of Clinical Pharmacology at Edinburgh University, will lead a discussion on how patients can be empowered in the relationship they have with their doctor, how we can all access more information about medicines and how not wasting medicines could save the NHS millions.

5.30pm | 90 mins  
**£8.50/£6.50/#SciPals students £4.25**  
 Summerhall | Main Hall  
 Presented by the British Pharmacological Society

SPECIAL EVENT



AGES 18+

## FEEDING TIME AT THE ZOO

Join us for a culinary adventure at RZSS Edinburgh Zoo. Arrive at Penguin's Rock for a drink with the penguins before heading to the Budongo Trail for a starter with the chimpanzees and then on to the mansion house for main and dessert. Throughout the evening you'll hear from the Zoo's keepers, nutrition experts and the Organic Chef in Residence as you enjoy a menu themed around the animals' favourite bites.

GASTROFEST

6pm | 3 hours  
**£40 (includes arrival drink and three course meal)**  
 RZSS Edinburgh Zoo



DISCUSSION

A PLANETARY PERSPECTIVE

## NATURE'S TARDIS

Time travel to restore extinct species is pure science fiction, but we can successfully bring back locally extinct species, as Scotland's sea eagles have shown. Translocation can provide endangered species with a second chance, but only if we understand the reasons for their decline. Ecologist **Sally Eaton** will lead a discussion with **Sarah Robinson** from the Royal Zoological Society of Scotland, **Prof Chris Thomas** from the University of York and **Andrew Bauer** from the National Farmers Union Scotland to explore the science and potential impact of translocation.

7pm | 90 mins  
**£8/£6/#SciPals students £4**  
 Royal Botanic Garden Edinburgh  
 Lecture Theatre  
 In association with Scottish Natural Heritage and The Royal Zoological Society of Scotland



DISCUSSION

BEING HUMAN

## THE ENTIRELY ACCURATE ENCYCLOPAEDIA OF EVOLUTION

Did human evolution stop once we had hospitals? Are humans born with an innate fear and hatred of strangers? Does the fossil record support a view of early humans as chronic warmongers? Stand-up comedian **Robert Newman**, author of *The Entirely Accurate Encyclopaedia of Evolution*, contrasts the pessimism of evolution bestsellers with the views of Darwin.

READING EXPERIMENT

8pm | 1 hour  
**£8.50/£6.50/#SciPals students £4.25**  
 Summerhall | Main Hall  
 Presented by Freight Books



SHOW

AGES 18+

BEYOND PLANET EARTH

## MISSION TO MARS

The race to set up a colony on the red planet is underway and we asked people to volunteer their own candidates to make the journey to Mars. Three of Scotland's most exciting writers will read brand new work inspired by these candidates. Featuring writers **Pippa Goldschmidt**, **Basil Davies** and **Olga Wojtas**. Chaired by **Lynsey Rogers** and presented by Scottish Book Trust's New Writers Awards programme.

READING EXPERIMENT

8pm | 1 hour  
**£8.50/£6.50/#SciPals students £4.25**  
 Summerhall | Anatomy Lecture Theatre  
 Presented by the Scottish Book Trust



# BIG BANG BASH

SPECIAL EVENT

AGES 18+

BEYOND PLANET EARTH

Join us for an out-of-this-world space party! Unleash your inner astronaut as you take a spacesuit selfie, help build a Mars colony from LEGO® bricks, send an encrypted message on a genuine Enigma machine and learn about the astrolabe whilst crafting one. Step inside our planetarium to discover the wonders of the solar system or take to the dance floor for the space themed *Science Ceilidh*. There'll also be short talks from space experts including *Mars One* finalist Ryan MacDonald and astrobiologist Lewis Dartnell. Not to mention the chance to get a space-themed cocktail from the *Bar at the End of the Universe* and dance the night away to a DJ set from Kid Canaveral. Get ready for an intergalactic night out to remember.

7pm | 3.5 hours

£12/£10 | National Museum of Scotland

Grand Gallery

Supported by



THE UNIVERSITY  
of EDINBURGH  
The Alwaleed Centre

ADULT EVENTS

SPECIAL EVENT

AGES 18+

GASTROFEST



## THE MEDICINAL MEAL

It's no longer good enough for foods to be simply tasty and filling. We now expect them to be nutritious, balance our gut microbiology, protect us from illness and even heal us. With the rise of the health-conscious consumer, few would doubt the marketing potential of 'superfoods', but just how super are they? Sample a taster-menu meal featuring some of the most popular superfoods with NHS dietitian Catherine Collins, botanist Dr Greg Kenicer from Royal Botanic Garden, gut health expert Dr Lindsay Hall and chef Paul Wedgwood on hand to talk you through what's fact and fiction.

8pm | 90 mins

£20 (includes a drink and canapés)

Summerhall | Dissection Room



## SUPPORT US!

From remarkable robotic workshops to exciting edible gardening projects, enlightening engineering talks and magnificent explorations of space travel, donations from our loyal audiences and supporters feeds directly into the production and delivery of our world-class events, reaching audiences of all ages and backgrounds.

We want to inspire people to discover the world around them, but we rely on the generosity of our supporters to help make that happen. All donations – big or small – make a huge difference and really can help put the science in the spotlight and Build a Better World!

## DID YOU KNOW THAT EDINBURGH INTERNATIONAL SCIENCE FESTIVAL IS A REGISTERED CHARITY?

### YOU CAN SUPPORT US:

Online by adding a donation to your ticket purchase

Over the phone on 0844 557 2686 or in person at the Box Office

By contacting the Development Team on 0131 553 0324 or [development@scifest.co.uk](mailto:development@scifest.co.uk)

To find out more about our work and other ways that you can support us, visit [sciencefestival.co.uk/supporters](http://sciencefestival.co.uk/supporters)

Registered Charity no. SC003790

# SATURDAY 2 APRIL

EXHIBITION



OUR BUILT ENVIRONMENT

## ROBERT POWELL: SPECIES OF SPACE

This solo exhibition by Edinburgh-based artist **Robert Powell** is a meditation on the city as a concept and physical artefact. It explores the idea of the 'universal city' and Edinburgh in particular, considering the lives and stories of its inhabitants. At the heart of the exhibition is an ambitious installation of a cardboard city, clad in screen-printed laser-cut wood veneers. A sculptural piece, that takes the form of an idealised walled city, cut off from its surroundings and complete in itself.

Saturday 26 March—Sunday 10 April  
(Tuesday—Saturday only)  
10am–6pm | drop-in  
Free | Edinburgh Printmakers

SPECIAL EVENT



AGES 18+

GASTROFEST

## WILD, SCOTTISH AND FREE

Imagine a future without farm animals or crops. What would we eat? Enjoy a unique, post-apocalypse, wild food dining experience with gastro-innovators **Buck and Birch**. The event starts off with foraging in the gardens for fresh spring delights, followed by a three-course gourmet lunch and seasonal drink.

11.30am | 3 hours  
£30 (includes lunch and seasonal drink)  
Royal Botanic Garden Edinburgh  
John Hope Gateway

DISCUSSION



BEYOND PLANET EARTH

## TERRAFORMING; TERRIFYING OR TERRIFIC?

Terraforming is the process of transforming a hostile environment into one suitable for human life. What are our options for ex-Earth living? Where could we live? How would we get there? We will attack these questions from all sides with the help of **Dr Jill Stuart**, a space-law expert, **Ryan MacDonald**, a man prepared to put his life on the line for the *Mars One* Project and planetary geologist and astrobiologist **Dr Louisa Preston**.

12.30pm | 90 mins  
£8.50/£6.50/#SciPals students £4.25  
National Museum of Scotland | Auditorium

DISCUSSION



A PLANETARY PERSPECTIVE

## THE KNOWLEDGE: HOW TO REBUILD OUR WORLD FROM SCRATCH

The world as we know it has ended and we must start again. What key knowledge do you need to survive in the immediate post-apocalyptic aftermath, avert another Dark Ages and accelerate the rebooting of civilisation from scratch? Join award winning scientist and author of *The Knowledge* **Dr Lewis Dartnell** as he talks about this grand thought experiment, shining a light on the behind-the-scenes fundamentals of how our world works.

5.30pm | 1 hour  
£8.50/£6.50/#SciPals students £4.25  
Summerhall | Main Hall

DISCUSSION



BEYOND PLANET EARTH

## NEWS FROM PHILAE

One of the most incredible achievements in 2014 was the landing of the *Philae* probe on the comet *67P/Churyumov-Gerasimenko*. But what did it find? What were its last words? And what does it mean for future missions? Join professor of astronomy **Hugh Jones**, along with a panel of other experts, to hear about the latest findings from the mission and the future of space exploration.

5.30pm | 90 mins  
£8.50/£6.50/#SciPals students £4.25  
Summerhall | Anatomy Lecture Theatre

SHOW



READING EXPERIMENT

## STRANGER THAN FICTION, THE PANEL GAME

Can you tell truth from lies and separate scientific reality from persistent myth? In this interactive game show our panel of distinguished authors, all non-fiction science writers, will be telling some great big porkies about science, but occasionally they'll drop in a few truths as they attempt to pull the wool over your eyes. Can you see through their deception? The truth is often stranger than fiction!

8pm | 1 hour  
£8.50/£6.50/#SciPals students £4.25  
Summerhall | Anatomy Lecture Theatre  
Presented by Stranger Than Fiction

SPECIAL EVENT



GASTROFEST

## CHEESEOLOGY

What makes a brie taste like a brie and a cheddar taste like a cheddar? What does salt bring to the flavour and durability of cheese? *Cheeseology* is an exploration of the food science that lies behind the development of flavour in different cheese varieties. Presented by **Paul Thomas**, dairy technologist, cheesemaking trainer and former professional cheesemaker, *Cheeseology* takes the trophile on a journey through the microbiology and biochemistry of this much loved food, bringing science to life with a tutored cheese tasting.

8pm | 90 mins  
£15 (includes tasters) | Summerhall  
Dissection Room



DISCUSSION



BEING HUMAN

### STRESS ON THE BATTLEFIELD

Combat Stress, the UK's leading mental health charity for veterans, is currently looking after almost 6,000 veterans aged between 18 and 97 years old. The charity has a firm focus on supporting recovery and is at the forefront of mental health provision for veterans with Post-Traumatic Stress Disorder (PTSD). Join Head of Psychological Therapies **Dr Nicola Sorfleet**, for an overview of the charity's work and an insight into the treatment of PTSD.

2pm | 1 hour

Free (ticket required)

The Scottish Parliament | Education Room

SPECIAL EVENT



SPECIAL EVENT

### BOARD GAMES WITH A SCIENCE-Y TWIST

Enjoy an afternoon of board games with a science-y twist that will give you the chance to tackle climate change, cure diseases or prevent lab explosions. Drop in for anything from 15 minutes of dice-throwing and collecting dinosaurs, to an hour or two of solving puzzles and saving the world. Children are very welcome but must be accompanied by an adult.

2–5pm | drop-in

Free | Summerhall | Cafe

Presented by State of Play

SCIENCE AND CULTURE



### BURNING QUESTIONS: WHAT SHOULD WE DO WITH OUR REMAINING FOSSIL FUELS?

Fossil fuels can be burned for energy or used as a raw material in the production of plastics, medicines, chemicals and fertilisers. We know we only have a finite amount left and need to make the best use of them, but what should we do with our remaining fossil fuels? Join our expert panel featuring **Prof Paul Ekins**, Director of the UCL Institute for Sustainable Resources, and **Prof Dave Reay**, Professor of Carbon Management and Education, to weigh up our options.

3pm | 90 mins

£8.50/£6.50/#SciPals students £4.25

National Museum of Scotland | Auditorium

Supported by



DISCUSSION



A PLANETARY PERSPECTIVE

### QUACKERY AND BAD MEDICINE

Discover Edinburgh's history of quackery and fake medicine in this fascinating event. In a behind-the-scenes tour of the Royal College of Physicians you will get the chance to see unusual equipment, early medical texts and illustrations revealing how charlatans plied their trade. Find out how people were persuaded to spend money on unicorn horn, live doves and Miracle Whirling Sprays.

2.30pm | 1 hour

also on at 6.30pm on Thursday 7 April

£8/£6 | Royal College of Physicians

DISCUSSION



OUR BUILT ENVIRONMENT

### TINY HOME SWEET HOME

The UN predicts that by 2060 66% of the world's population will live in urban environments. One of the biggest challenges ahead of us is meeting housing requirements for this tribe of city dwellers. Space is limited and expensive so some developers are thinking small. How does this help as we also consider the needs of those currently without a home? Our expert panel including tiny home developer **Dr Michael Page**, **Eric Reynolds** of Urban Space Management, expert in urban planning **Dr Caroline Brown** and **Julia Glenn** of Extremis Technology discuss what makes a home and how to create a place in which we thrive.

8pm | 90 mins

£8.50/£6.50/#SciPals students £4.25

Summerhall | Main Hall

Our Built Environment events are supported by Scotland's Year of Innovation, Architecture

EXHIBITION

OUR BUILT ENVIRONMENT

## TINY HOMES VILLAGE

Urban populations are on the rise. As a result a growing number of home developers are 'thinking small'; challenging conventions and expectations as to what a home looks like and the size it is expected to be and looking to overcome obstacles through innovative architectural design.

In the Year of Innovation, Architecture and Design, our *Tiny Homes Village* will transform The Mound Precinct into a platform for discussion of what turns a simple roof over our heads into somewhere we are happy to call home. From tiny homes to self-sustaining eco pods, traditional Mongolian yurts and emergency housing solutions, we challenge Edinburgh's city dwellers to consider how far – indeed how small – they would be prepared to go.

Saturday 26 March–Sunday 10 April | Free | drop-in | The Mound Precinct



Our Built Environment is supported by



ONLINE BOOKING: [sciencefestival.co.uk](http://sciencefestival.co.uk) BOOKING HOTLINE: 0844 557 2686

ADULT EVENTS

49



SPECIAL EVENT

### 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 Edinburgh International Science Festival.



DISCUSSION

BEYOND PLANET EARTH

### SPACEPORT SCOTLAND

With the continuing rocket launches of SpaceX and Blue Origin, private business is gaining a greater role in the expanding industrialisation and exploration of space. Coupled with the UK Government's announcement of a shortlist of possible sites of a British Spaceport, the chances are high that the next generation of space-launch vehicles could find a home in Scotland. Join **Steve Lee** of Astrosat, **Dr Hina Bacai** from the Scottish Centre of Excellence in Satellite Applications and other experts as they discuss the opportunities that could arise.



DISCUSSION

BEYOND PLANET EARTH

### PHYSICS TO BLOW YOUR MIND

*Physics to Blow Your Mind* is back! Join us for an eye-opening journey through some of the most curious and intriguing secrets of the cosmos. Cosmologist **Prof Sarah Bridle** will explore enigmatic dark energy, the purported cause of the mysterious accelerated expansion of the Universe, and **Dr Michal Michalowski** will unlock some of the secrets of how stars are formed. Not for the physics-faint-hearted!

## SUNDAY 3 APRIL

11.30am | 2 hours  
Free | St Giles Cathedral

12.30pm | 90 mins  
£8.50/£6.50/#SciPals students £4.25  
National Museum of Scotland | Auditorium

3pm | 90 mins  
£8.50/£6.50/#SciPals students £4.25  
National Museum of Scotland | Auditorium

EXHIBITION



### SYMMETRIES IN LIGHT

This international exhibition by the Japan Kaleidoscope Museum and the Universities of Edinburgh and St Andrews, celebrates the life and work of Scottish physicist Dr David Brewster who invented the kaleidoscope 200 years ago. Featuring kaleidoscopes of different sizes, styles and principles, including some beautiful examples brought over to the UK specially, the exhibition unlocks the dazzling beauty of this traditional art and illustrates how Brewster's work in optics has influenced modern science and society.

Opening times vary | drop-in on until Sunday 10 April (not Wednesday 6 April)  
Free | Playfair Library  
Presented by The University of Edinburgh

SPECIAL EVENT  
GASTROFEST

# 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 cooking demonstrations, a series of short talks and a variety of interactive stalls, *SciMart* offers up a packed menu and food for thought. New for 2016: learn all about the science of chillies in *Trial by Capsaicin* and have a go at cheesemaking with dairy expert Paul Thomas.

3 April | 11am-4pm drop-in  
£3.50 (under 12s free) | Throughout Summerhall



DISCUSSION



SCIENCE AND CULTURE

### CAN PORNOGRAPHY BE GOOD FOR YOU?

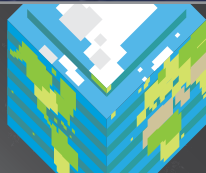
Do we need to get over our inhibitions when it comes to pornography? Renowned obscenity lawyer **Myles Jackman**, psychotherapist **Paula Hall** and cultural theorist **John Mercer** join **Richard Lucas** of the Solas Centre for Public Christianity for a lively debate examining key questions about pornography – is it part of a healthy sexual freedom of expression or something that can be both socially and psychologically damaging, and how can we map its influences and effects?

8pm | 90 mins

£8.50/£6.50/#SciPals students £4.25

Summerhall | Dissection Room

DISCUSSION



OUR BUILT ENVIRONMENT

READING EXPERIMENT

### DESIGNING FICTIONAL WORLDS

Come and delve into the virtual world! In this fascinating event we'll look at how fictional worlds are designed and created, what paradigms the designers and writers base them on, and the psychology of why so many people are drawn to them. Join our panel of experts including award winning author **Charles Stross** and **Emese Domahidi**, researcher in social aspects of gaming, and **Andy Robinson**, games designer and creator of *EVE: Valkyrie* as they discuss how fictional worlds can help us deal with the real world.

8pm | 90 mins

£8.50/£6.50/#SciPals students £4.25

Summerhall | Main Hall

*Our Built Environment* events are supported by Scotland's Year of Innovation, Architecture and Design

DISCUSSION



A PLANETARY PERSPECTIVE

GASTROFEST

### FEEDING THE 7 BILLION

Global food production needs to double by 2050 to feed our ever-growing population. Will laboratory produced meat and vertical farms be the answer? Or is growing food locally a global solution? Our future food experts including **Peter Verstate** from Cultured Meat, senior research fellow in public health nutrition **Dr Joanna Kaniewska**, **Stuart Guzinski** from Leith Food Assembly and **Mark Horler**, from the Association for Vertical Farming, will explore how to feed the world.

8pm | 90 mins

£8.50/£6.50/#SciPals students £4.25

Summerhall | Anatomy Lecture Theatre

*A Planetary Perspective* events are supported by Greener Scotland

DISCUSSION



OUR BUILT ENVIRONMENT

### FUTURE CITIES: DO THEY ALL ADD UP?

What will the cities of the future look like? How will people get their energy and dispose of their rubbish? These questions may be hard to think about but maths just might be able to give us some answers! Join **Prof Chris Budd**, **Dr Hannah Fry**, **Prof Peter Grindrod**, **Prof Des Higham**, **Dr Nick McCullen** and **Dr Paul Shepherd** to discuss how cities will evolve in the future and why decisions and interventions should be based on quantitative, testable predictions.

8pm | 90 mins

£8.50/£6.50/#SciPals students £4.25

Summerhall | Red Lecture Theatre

Presented by the International Centre for Mathematical Sciences

ADULT EVENTS

# A PLANETARY PERSPECTIVE



We are at a crucial turning point in human development; a point at which we can choose how we want to continue to develop our planet, resources and communities. We have at our disposal a wealth of technological advances and knowledge that might help us address the challenges we will face but how will we apply them?

*A Planetary Perspective* events will explore the ways in which scientific endeavours will help us to feed the world, fuel the world and maintain a beautiful world in the years to come. Covering topics as diverse as how we can feed our ever-growing population (p.51) and how to rebuild our world from scratch (p.49), these events will explore the role science has to play in helping to ensure environmental sustainability on Earth.

We'll explore climate change with **Prof Chris Rapley**, one of the world's leading climate scientists, as he presents his critically acclaimed one-man show *2071: The World We'll Leave Our Grandchildren* (p.61). Echoing an event from 2015 that looked at the road to the Paris climate talks, we'll take a look at the most important resolutions arising from the 21st Conference of the Parties on Climate Change in *The Road from Paris* (p.52).

This important series of events features high profile speakers and hands-on experiences and are tagged throughout the brochure with *A Planetary Perspective*.

A Planetary Perspective is supported by



ONLINE BOOKING: [sciencefestival.co.uk](http://sciencefestival.co.uk) BOOKING HOTLINE: 0844 557 2686

51

# MONDAY 4 APRIL



DISCUSSION

READING EXPERIMENT

## A VERY SHORT INTRODUCTION TO... EVOLUTION

Less than 250 years ago, most European scholars believed that the Universe was created essentially in its present state about 6,000 years ago. Join **Prof Brian Charlesworth** and **Prof Deborah Charlesworth** as they explain the crucial role of evolutionary biology in transforming our view of human origins and relation to the Universe. You'll discover some of the most important basic findings, concepts, and procedures of evolutionary biology, as it has developed since the first publications of Darwin and Wallace, over 140 years ago.

1pm | 1 hour  
**£6/#SciPals students £3** | Summerhall  
**Anatomy Lecture Theatre**  
 Presented by Oxford University Press



DISCUSSION

SCIENCE AND CULTURE

## OLYMPIANS: BORN OR BUILT?

What does it take to be a champion? Can you get there through just blood, sweat and tears? Or does elite athleticism need to be hardwired in your genes? Chaired by Paralympian **Dan Gordon**, join our panel of experts, Scottish Marathon Champion **Megan Crawford**, geneticist **Yannis Pitsiladis**, and sports psychologist **Edward Coughlan** to discover the relative contributions of genetics and training in the makings of an elite performer. On your marks, get set, go!

5.30pm | 90 mins  
**£8.50/£6.50/#SciPals students £4.25**  
**Summerhall | Dissection Room**  
 Presented by The Physiological Society and Royal Society of Biology



SHOW

READING EXPERIMENT

## LINNAEAN LIMBO: THE DINOSAURS THAT NEVER WERE

In a storytelling show blending theatre, palaeontology and the history of science, *Linnaean Limbo* takes a look at the dinosaurs that never really were. **Illicit Ink** have mustered the very best writer-performers and science communicators to make up a cast of special guests, including author **Emily Dodd**. Together they'll celebrate how science constantly revises and updates itself... By passing the mic to the discoveries that have become defunct as a result!

5.30pm | 90 mins  
**£8.50/£6.50/#SciPals students £4.25**  
**Summerhall | Anatomy Lecture Theatre**  
 Presented by Illicit Ink



DISCUSSION

BEING HUMAN

## THE KNOTTED STRANDS OF LIFE

Join **Prof Davide Marenduzzo** from The University of Edinburgh and **Prof De Witt Sumners** from Tallahassee University as they talk topology and journey through the story of knots. They'll travel from their humble beginnings to today's cutting-edge science where knots have important applications for DNA and understanding the structure of genes, and are even informing the design of anticancer drugs.

5.30pm | 90 mins  
**£8.50/£6.50/#SciPals students £4.25**  
**Summerhall | Anatomy Lecture Theatre**



DISCUSSION

BEING HUMAN

## NEXT GENERATION MINDFULNESS

Join writer and broadcaster **Madeleine Bunting**, youth mindfulness advocate **Michael Bready** and buddhify founder and mindfulness technology expert **Rohan Gunatillake** as they explore the rapid rise of mindfulness. Part talk, part experience, this event will explore the integration of meditation with technologies and how these can be used to transform our engagement with the real and digital world, and how mindfulness methodologies are being used to support learning and promote better health.

5.30pm | 90 mins  
**£8.50/£6.50/#SciPals students £4.25**  
**Summerhall | Red Lecture Theatre**



DISCUSSION

A PLANETARY PERSPECTIVE

## THE ROAD FROM PARIS

Following the IPCC climate talks in Paris, we take a look at the most important resolutions arising from the summit. Do we have a realistic chance of fulfilling the terms? What strategies might emerge and what could this mean for our economic and environmental future? **Stephen Smith**, Senior Analyst at the Committee on Climate Change is joined by **Andrew Bradley**, Chief of Strategic Communications at the European Climate Foundation, and **Michael McCarthy**, Environmental Commentator for *The Independent*, to discuss what happens next.

5.30pm | 90 mins  
**£8.50/£6.50/#SciPals students £4.25**  
**National Museum of Scotland | Auditorium**  
 Supported by



Edinburgh Zoo 7.30pm LIFE OF PI AND TIGER TALK See page 29

FILM



BEYOND PLANET EARTH

## THE VISIT

Earth may not have been visited by aliens, but ever since the invention of radio and television, humans have been announcing their existence to other civilizations. Join acclaimed film director **Michael Madsen** and Royal Society scientist **Martin Dominik** for a thought-provoking journey into the unknown. With unprecedented access to the UN Office for Outer Space Affairs, NASA and the SETI Institute, this film builds a chillingly believable scenario of first contact on Earth. Introduced by Michael and Martin, the screening will be followed by a drinks reception.

6pm | 2.5 hours

£10.50/£8.50 #SciPals students £4.25

Filmhouse

Presented by The Royal Society



DISCUSSION

BEING HUMAN

## THE RIGHTS OF THE MACHINE

In 2015, two chimpanzees in New York were granted 'legal person status' by a court ruling. This action has potentially groundbreaking implications in the field of medical ethics. Do intelligent robotic systems deserve civil rights? Or even human rights? Join **Kathleen Richardson** from the Campaign Against Sex Robots, and **Dr Patricia Vargas**, Roboethicist and Director of Heriot-Watt University's Robotics Laboratory, as they explore the rights of the machine.

8pm | 90 mins

£8.50/£6.50/#SciPals students £4.25

Summerhall | Red Lecture Theatre

SPECIAL EVENT



GASTROFEST

## CHOCOLATE: FOOD OF THE GODS

The seeds known to science as *theobroma cacao* (meaning 'food of the gods') have a long and fascinating history. In this special interactive evening, we will investigate the past, present and future of chocolate. Chocolate writer and Chief Executive of the Royal Academy of Culinary Arts **Sara Jane Staynes OBE** is joined by **Prof Paul Hadley**, head of the Cocoa Project at the University of Reading, and master chocolatier **Aneesh Poppat** for a scientific feast for the senses not to be missed. Hosted by **Susan Morrison**.

8pm | 90 mins

£15 (includes tasters) | Summerhall

Dissection Room

Supported by



DISCUSSION

SCIENCE AND CULTURE



## DON'T KNOW WHAT TO BELIEVE? ASK FOR EVIDENCE

Every day, we hear claims about what is good for our health or bad for the environment and how to improve education, cut crime and treat disease. But how do we know what to believe? Join a panel of speakers from Sense About Science, Research The Headlines, the Nappy Science Gang and The Young Academy of Scotland as they share stories from allotment growers, powerlifters, personal trainers and others who stood up for science and asked for evidence.

8pm | 90 mins

£8.50/£6.50/#SciPals students £4.25

Summerhall | Anatomy Lecture Theatre

Presented by Sense About Science

Summerhall | Hacklab  
The Banshee Labyrinth 7.30pm AT THE FRINGE OF REASON: SKEPTICS IN THE PUB See page 39

7pm EXTREME SOLDERING See page 43

DISCUSSION

OUR BUILT ENVIRONMENT



## LINKING OUR CITIES

What's the cost of our reliance on roads and fossil fuel powered vehicles? And, as we accelerate into the future, what innovations and improvements can we hope for to reduce these impacts? Meet experts including Arup Foresight Analyst **Lynne Goulding**, autonomous vehicle research leader **Dr Natasha Merat** and **Prof Martin Tangney** of Celtic Renewables, to discover what changes are just around the corner and the big ideas leading us down the road to the future.

8pm | 90 mins

£8.50/£6.50/#SciPals students £4.25

National Museum of Scotland | Auditorium

Our Built Environment events are supported by Scotland's Year of Innovation, Architecture and Design

DISCUSSION

BEING HUMAN



## ERADICATING EBOLA AND OTHER EPIDEMICS

The recent outbreak in West Africa brought Ebola to the attention of people around the world. Join **Prof Mark Woolhouse**, infectious disease epidemiologist at The University of Edinburgh, **Dennis Kerr** from Médecins Sans Frontières and **Prof Sarah Gilbert**, professor of vaccinology at the University of Oxford, to examine this disease. They will look at its symptoms, how it spreads and how to stop it, as well as discussing how technology can be used to track epidemics and how new deadly pathogens emerge.

8pm | 90 mins

£8.50/£6.50/#SciPals students £4.25

Summerhall | Anatomy Lecture Theatre

The Banshee Labyrinth 7.30pm AT THE FRINGE OF REASON: SKEPTICS IN THE PUB See page 39

SPECIAL EVENT



GASTROFEST

## LAVISH LEFTOVERS

Households in Scotland throw away an incredible 566,000 tonnes of food every year. It's thought that three quarters of this waste could be avoided if we practiced better management in our buying, cooking and consumption. In this age of increasing strain on our natural resources is it time we reassessed our food habits? In this interactive event we'll serve up dishes made from ingredients that might otherwise have gone to waste alongside advice and information from food experts including **Pete Ritchie**, director of Nourish Scotland, and a representative from The Real Junk Food Project.

8pm | 90 mins

£15 (includes 3 courses) | Summerhall

Main Hall

DISCUSSION

A PLANETARY PERSPECTIVE



## CLIMATE CHANGE: MIGRATE TO ADAPT

Climate-induced migration is likely to be one of the big challenges the world faces in the 21st century. As the Earth's temperatures rise and weather becomes more extreme and unpredictable, more and more areas of our planet will become too harsh to live in and migration will become a form of adaptation. Join experts including **Alex Randall**, from the UK Climate Change and Migration Coalition, and climate change and conflict researcher **Dr Christian Almer** to explore this important topic.

8pm | 90 mins

£8.50/£6.50/#SciPals students £4.25

Summerhall | Red Lecture Theatre

# WEDNESDAY

## 6 APRIL



DISCUSSION

READING EXPERIMENT | BEING HUMAN

### A VERY SHORT INTRODUCTION TO...THE BODY

Explore the challenges associated with our perceptions of the human body in this fascinating introduction. While conventionally thought of as biological entities, since the mid-1980s there has been a rising awareness of how our bodies, and our perception of them, are influenced by the social, cultural and material contexts in which we live. **Prof Chris Shilling**, Professor of Sociology, looks at issues ranging from cosmetic and transplant surgery to conceptions of the body as sacred.

1pm | 1 hour

£6/#SciPals students £3 | Summerhall  
Anatomy Lecture Theatre

Presented by Oxford University Press



DISCUSSION

A PLANETARY PERSPECTIVE

### POWERING THE FUTURE: HOW WILL YOU POWER YOUR HOME IN 2025?

In 2014 renewable energy provided the single largest source of electricity in Scotland for the first time, however this energy supply varies hugely with weather conditions. Learn about smart grids, a new technology that helps match energy supply with our electricity needs, and hear how we can balance energy supply and demand from The University of Edinburgh's School of Engineering researchers **Prof John Thompson** and **Dr Aristides Kiprakis** in this interactive event.

5.30pm | 90 mins

£8.50/£6.50/#SciPals students £4.25  
Summerhall | Main Hall

Presented by The University of Edinburgh



DISCUSSION

OUR BUILT ENVIRONMENT

### HEALTHY, HAPPY CITIES

Design principles are increasingly being used creatively to influence how we interact with urban spaces. Our built environment has a direct impact on how we humans feel, think, and behave, but how can our cities help us live healthier lives? Introduced by **Jane-Claire Judson**, National Director of Diabetes Scotland, this event brings together experts in the field, including Edinburgh architect **Richard Murphy OBE** and Professor of Design Management **Rachel Cooper OBE**, to discuss the history and future of city design.

5.30pm | 90 mins

£8.50/£6.50/#SciPals students £4.25  
Summerhall | Dissection Room

Supported by



DISCUSSION

BEING HUMAN

### THE SEVEN AGES DEBATE

Technology, medicine and the manipulation of mitochondria have enabled humans to live beyond the frontier of our traditional fourscore years and ten. But what could, or should, be the limitations of the human body? Senescence expert **Prof Aubrey de Grey** is joined by sociologist **Prof Steve Fuller**, philosopher and physician **Prof Raymond Tallis** and **Prof Dominic Wilkinson**, Director of Medical Ethics at the Oxford Uehiro Centre, to debate questions that have been submitted by our audience and others around the world through the #sevenagesdebate. Hosted by the BBC's **Pennie Latin**.

8pm | 90 mins

£8.50/£6.50/#SciPals students £4.25  
National Museum of Scotland | Auditorium



SPECIAL EVENT

AGES 18+

GASTROFEST

### WHY DO GUITARS TASTE OF HOPS?

Award winning beer writer and passionate music fan **Pete Brown** began pairing his favourite beers and tracks for fun, but a few years ago he discovered scientific principles behind the matches. Since then he's been on a journey of discovery, investigating how our senses enhance, complement and sometimes confuse each other. Join him for an interactive show that's part neuroscience, part memoir and part comedy, with real-time scientific experiments and some fine beer tasting.

8pm | 90 mins

£12/£10 | Summerhall Dissection Room



SHOW

BEYOND PLANET EARTH

### TO SPACE

Scientist and performer **Dr Niamh Shaw** has dreamed of space travel from the age of eight. Throughout 2014 she interviewed astronauts, astrophysicists, space industry experts and potential colonists of Mars to put together this multimedia performance which explores the beauty, darkness and humanity of space. *'What begins as a show about space slowly shifts to become something far more profound and personal about dashed hopes and disillusion – and the crucial importance of retaining a sense of wonder.'* David Kettle, *The List*

8pm | 1 hour

£8.50/£6.50/#SciPals students £4.25  
Summerhall | Anatomy Lecture Theatre



DISCUSSION

### IN THE FOOTSTEPS OF JAMES CLERK MAXWELL

James Clerk Maxwell, Scotland's greatest physicist, made massive leaps forward in our knowledge and understanding of electricity, magnetism and light. **Prof Sir David Payne**, director of the Optoelectronics Research Centre at the University of Southampton, is building on those foundations. A pioneer of technology, he has led the field of telecommunications and laser research for many years and achieved international acclaim in the area of photonics. Join us for a special event where Prof Payne shares stories of trials and tribulations from the research world.

5.30pm | 90 mins

£8.50/£6.50/#SciPals students £4.25  
National Museum of Scotland | Auditorium

Supported by the James Clerk Maxwell Foundation

DISCUSSION



A PLANETARY PERSPECTIVE

## OCEAN JUNKYARD

Dive into our oceans and discover how they are under threat. Plastic waste is a huge problem with around 8.8 million tons of plastic being dumped into the world's oceans each year, a number that is set to increase. Join professor of environmental science **Prof Teresa Fernandes**, oceanographer with Marine Scotland **Dr Barbara Berx**, **Matt Barnes** from Marine Conservation Society and another expert in ocean plastics to discuss some of the big problems facing our oceans.

5.30pm | 90 mins

£8.50/£6.50/#SciPals students £4.25

Summerhall | Anatomy Lecture Theatre

A Planetary Perspective events are supported by Greener Scotland

Summerhall | Hacklab

7pm | SOLDER ON!

The Bannister Labyrinth

7.30pm | AT THE FRINGE OF REASON: SKEPTICS IN THE PUB See page 39

FILM



BEING HUMAN

## SHORT SIGHTED CINEMA: MIND'S EYE

The power of the human mind can be a creative might, but the limits of its abilities lie in a delicate balance. Our mortal bodies are bombarded by risk and our minds plagued by the pressures of progress. Have we become too fragile to evolve? A programme of short films followed by live discussion with specially invited guests.

Please Note: these independent short films have not been certified and adult viewers are responsible for assessing the risk if accompanying young people under 18 years of age.

8pm | 2 hours

£8.50/£6.50/#SciPals students £4.25

Summerhall | Red Lecture Theatre

Presented by Short Sighted Cinema

DISCUSSION



A PLANETARY PERSPECTIVE

## CAN WE ADDRESS FUEL POVERTY AND RESPOND TO CLIMATE CHANGE?

Are the UK and Scottish Governments' actions to address fuel poverty and climate change compatible? The Church of Scotland will report on this issue at the General Assembly in May. Join **Sarah Boyack MSP**, **Elizabeth Leighton**, Policy Advisor and secretariat at the Existing Homes Alliance Scotland, **John Cunningham**, Head of Energy Unit for Western Isles Council and **Shona Stephen**, Chief Executive, Queen's Cross Housing Association, to explore the issues.

8pm | 90 mins

£8.50/£6.50/#SciPals students £4.25

Summerhall | Main Hall

Presented by the Church of Scotland



Showcasing the importance of science in the most delicious way possible, *GastroFest* returns in 2016 with a packed menu featuring producers, artisans, scientists and chefs. From the tempting and tantalising to the downright delicious, this smorgasbord of insightful discussions, thought-provoking presentations and out-of-this-world foodie experiences offers options to suit all tastes.

Go beyond the beyond at the unique event *The Futurist Meal* (p.44) and enjoy an experimental meal inspired by Marinetti's 1930 *Manifesto of Futurist Cuisine*. Celebrate the scientific masterpiece that is the cocktail with *A Short History of the Cocktail* (p.56) – a history lesson that's guaranteed not to be dry.

Pick up some tasty treats as you explore a farmers' market with a scientific twist at *SciMart* (p.50), explore the food science that lies behind the development of flavour in different cheese varieties in *Cheeseology* (p.48) or investigate the past, present and future of chocolate in our interactive event, *Chocolate: Food of the Gods* (p.53).





DISCUSSION

READING EXPERIMENT

### A VERY SHORT INTRODUCTION TO... SOUND

Sound is integral to how we experience the world, both in the form of noise as well as music. But what is sound? What is the physical basis of pitch and harmony? And how are sound waves exploited in musical instruments? **Mike Goldsmith** looks at the science of sound and explores sound in different contexts, covering the audible and inaudible, sound underground and underwater, acoustic and electric, and hearing in humans and animals.

1pm | 1 hour  
£6/#SciPals students £3 | Summerhall  
Anatomy Lecture Theatre  
Presented by Oxford University Press



DISCUSSION

### SPOTLIGHT ON: CELTS SILVER, THE GLENMORANGIE RESEARCH PROJECT

Join National Museums Scotland's analytical scientist **Lore Troalen** and archaeologist and Glenmorangie Research Fellow **Alice Blackwell** as they discuss some of the precious silver pieces featured in the museum's *Celts* exhibition, organised in partnership with the British Museum. Lore and Alice will share insights into the archaeological and scientific research used to find out more about these compelling objects. Supported by The Glenmorangie Company.

2pm | 1 hour  
Free (ticket required)  
National Museum of Scotland | Auditorium  
Presented by the National Museum of Scotland



DISCUSSION

OUR BUILT ENVIRONMENT

### BRIDGING THE FORTH

Cross the Firth of Forth, from the old to the new. Celebrate the new Queensferry Crossing and look back at the history of the existing bridges. What innovative designs and cutting edge engineering is behind the Queensferry Crossing? And why is the Forth Rail Bridge referred to as a 'masterpiece of human creative genius'? Join a panel including **Jenni Meldrum** and **Frank Hay**, researchers for the book *The Briggers*, and experts from the Forth Crossing Bridge Constructors and Amey to look at all three bridges.

5.30pm | 90 mins  
£8.50/£6.50/#SciPals students £4.25  
Summerhall | Red Lecture Theatre  
*Our Built Environment* events are supported by Scotland's Year of Innovation, Architecture and Design

# THURSDAY 7 APRIL

The Banshee Labyrinth 7.30pm AT THE FRINGE OF REASON: SCEPTICS IN THE PUB See page 39

SPECIAL EVENT



AGES 18+

GASTROFEST

### A SHORT HISTORY OF THE COCKTAIL

A cocktail is a scientific masterpiece, the perfect combination of ingredients, processes and equipment. From the first cocktail made in 1806 to the proliferation of drinks available today, it has had an exciting life throughout the eras. Join **Donald Reid**, food and drinks editor at *The List*, food scientist **Steve Pearce** and award winning mixologist **Rosie Paterson**, colour psychologist **Angela Wright** and **Paul Donegan** from Pickering's Gin, for an evening of mixology mastery that will show how the art of cocktail making has become a science.

8pm | 90 mins  
£20 (includes cocktails)  
Summerhall | Dissection Room

DISCUSSION



OUR BUILT ENVIRONMENT

### THE ARUP LECTURE 2016: MEANINGFUL CITY INFRASTRUCTURE

As the world becomes more urbanised, our cities are under rapid transformation. To support this change requires more and more infrastructure – whether this is the physical infrastructure of transport, water, and energy systems, or the soft infrastructure of the likes of education and healthcare. Join **Malcolm Smith**, Arup's Global Urban Design Leader, to explore the importance of meaningful infrastructure in the cities of the future and why optimised systems and multiple outcomes must be the future of our new urban infrastructures.

8pm | 90 mins  
£8.50/£6.50/#SciPals students £4.25  
National Museum of Scotland | Auditorium

Supported by **ARUP**

DISCUSSION



A PLANETARY PERSPECTIVE

### WATER, THE ELIXIR OF LIFE

Water is a wondrous substance: it washes, it rinses, and it's delicious. But for many communities on the planet, the scarcity of this precious resource makes day-to-day life difficult. In this session we'll introduce some innovators who are coming up with ways to secure sources of water and ensure it remains drinkable. Industrial designer **Arturo Vittori**, The Oxford Water Network's **Dr Katrina Charles** and **Helen Anderson**, Head of WaterAid Scotland and Northern Ireland, will present their inventions and research and discuss their motivations to capture and protect the elixir of life.

8pm | 90 mins  
£8.50/£6.50/#SciPals students £4.25  
Summerhall | Anatomy Lecture Theatre  
*Planetary Perspective* events are supported by Greener Scotland

DISCUSSION



BEING HUMAN

### LEVEL UP HUMAN

Evolution has gotten lazy and needs a prod. Combining gene splicing and transhumanism, medical advancement and surgical enhancement, biology and ambition, *Level Up Human* takes a light-hearted look at what it means to be human, and what the alternatives might be. Join **Simon Watt** and guests **Aubrey de Gray** and **Susan Morrison** for the live recording of an exciting new podcast series where you will get the chance to contribute to the design spec for the next stage of human evolution.

8pm | 90 mins  
£8.50/£6.50/#SciPals students £4.25  
Summerhall | Main Hall



DISCUSSION



SCIENCE AND CULTURE

## BIG BROTHER IS NUDGING YOU

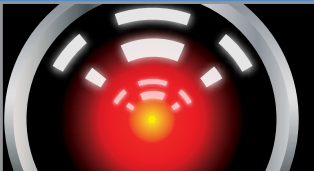
From David Cameron's Behavioural Insights Team to Barack Obama's executive order on behavioural science, people in power are increasingly embracing insights from psychological science to 'nudge' citizens towards 'better' choices. But do they know what a better choice is? Psychologist **Stuart Ritchie**, behavioural scientist **Philip Newall**, Director of The University of Edinburgh's Behavioural Laboratory **Michele Belot**, philosopher of ethics, government and coercion, **Ben Sachs** and **Gregor Urquhart**, Head of Smarter, Wealthier & Fairer Marketing with the Scottish Government, investigate.

5.30pm | 90 mins

£8.50/£6.50/#SciPals students £4.25

Summerhall | Anatomy Lecture Theatre

DISCUSSION



BEING HUMAN

READING EXPERIMENT

## UNBOTTLING THE AI DEMON

Tech entrepreneur Elon Musk has predicted that AI might be the greatest existential threat humans will have to face and Prof Stephen Hawking has warned that the development of full artificial intelligence could spell the end of the human race. But is technology already hurting us? And should we put the brakes on AI before it is too late? Prof **Raymond Tallis** will chair a discussion featuring AI researcher **Dr Joanna Bryson** and scientist and author **Prof Kevin Warwick** as we investigate the risks that could arise from the development of human-level artificial intelligence.

5.30pm | 90 mins

£8.50/£6.50/#SciPals students £4.25

National Museum of Scotland | Auditorium

DISCUSSION



SCIENCE AND CULTURE

## SCIENCE EDUCATION: WHY DO WE NEED IT?

How can education inspire and nurture curiosity? Is science education simply a supply system for future scientists, or should it provide us with a scientifically adept society, one ready to understand, critique and mould the future of research? Join scientist **Dame Julia Higgins**, education researcher **Prof Sally Brown** and teacher **Adrian Allan**, as they discuss the role of science education in shaping society's future with journalist and broadcaster **Kenneth Macdonald**.

5.30pm | 90 mins

£8.50/£6.50/#SciPals students £4.25

Summerhall | Main Hall

Presented by the Royal Society and the Royal Society of Edinburgh

DISCUSSION



A PLANETARY PERSPECTIVE

## HOW WILL WE POWER THE UK IN THE FUTURE?

We're delighted to welcome the UK Government's Chief Scientific Adviser **Sir Mark Walport**, and **Prof Iain Stewart** to the Science Festival. We rely on energy every day to run our homes and power our cars but how we get this energy is changing and the UK now faces a series of choices about energy as we look for sources that are secure, affordable and sustainable. In this free public talk, Sir Mark and Iain will introduce you to the options we have for powering the UK in the future.

7pm | 90 mins

Free (ticket required) | Dynamic Earth Biosphere

DISCUSSION



SCIENCE AND CULTURE

READING EXPERIMENT

## UNBELIEVABLE: SCIENCE EXPLORES THE PARANORMAL

Go with your intuition and join us for a rare opportunity to explore paranormal mysteries with the Koestler Parapsychology Unit. Parapsychologist **Dr Caroline Watt** will be your host in this interactive talk launching her new book *Parapsychology: A Beginner's Guide*. Discover the science behind dowsing, telepathy and psychic readings. How intuitive are you? Would you make a good fake psychic? And how do parapsychologists test for extra-sensory perception? Skeptics and believers welcome.

8pm | 70 mins

£8.50/£6.50/#SciPals students £4.25

Summerhall | Red Lecture Theatre

# BEYOND PLANET EARTH

From Greek philosophers to young children with telescopes, humans have always been fascinated with the stars in the sky and what could lie beyond our sight. *Beyond Planet Earth* is our series of events that explore the non-Earthbound opportunities and challenges that we will face as we attempt to build better worlds beyond the little blue planet we currently call home.

As private businesses begin to drive space exploration forward as much as government agencies, we present an evening exploring the surprisingly reachable areas of space in *DIY Space Exploration* (p.38). Sticking with space exploration, we look at what Scotland's role could be in venturing beyond our planet and if the next generation of space-launch vehicles could find a home in Scotland in *Spaceport Scotland* (p.50).

*Beyond Planet Earth*  
supported by



Science & Technology  
Facilities Council

Space finds its social side in our popular *Big Bang Bash* (p.47) that sees the National Museum of Scotland transformed into a late night out-of-this-world space party complete with space-themed cocktails and roving scientists. Bringing a down to earth view of out of this world experiences, European Space Agency Astronaut **Jean-François Clervoy** will share his insights into life in space and will bring the latest news on Tim Peake's Principia Mission on ISS (p.32 and p.45).

In our *Beyond Planet Earth* series of events we'll be joined by top astrophysicists, space explorers and innovators and we'll explore what the not-so-distant future may have in store in terms of discovery, travel and understanding. Join us for a journey that is truly out of this world! Look out for *Beyond Planet Earth* tagged events throughout this brochure.



DISCUSSION

BEYOND PLANET EARTH

### A VERY SHORT INTRODUCTION TO... MOONS

Moons are far more common than planets in our Solar System. On the moons of the giant outer planets, scientists have glimpsed volcanic activity on Io, found oceans of water on Titan, and captured photos of icy geysers bursting from Enceladus. Join **Prof David Rothery** as he gives a fascinating introduction to the moons of our Solar System, beginning with the early discoveries of Galileo and the early use of Jupiter's moons to establish position at sea and to estimate the speed of light.

1pm | 1 hour  
£6/#SciPals students £3 | Summerhall  
Anatomy Lecture Theatre  
Presented by Oxford University Press



DISCUSSION

READING EXPERIMENT

### DEATH ON EARTH. ADVENTURES IN EVOLUTION AND MORTALITY

Planet Earth teems with trillions of life-forms, each going about their own business: eating, reproducing, thriving; yet the life of almost every single entity draws nearer and nearer to certain death. Why is death such a universal companion to life on Earth? Why haven't animals evolved to break free of its shackles? Join science communicator **Simon Watt** for a conversation with **Jules Howard**, author of *Death on Earth*, in an attempt to shed evolutionary light on one of our biggest and most unshakeable taboos.

5.30pm | 1 hour  
£8.50/£6.50/#SciPals students £4.25  
Summerhall | Anatomy Lecture Theatre  
In association with Bloomsbury Publishing



FILM

A PLANETARY PERSPECTIVE

### BIKES VS CARS: A PEDAL POWERED SCREENING

Enjoy guilt-free cinema as we present this bike-powered movie night. You'll enjoy a screening of *Bikes vs Cars*, a feature length movie that investigates the daily global drama in traffic around the world, along with a series of short films – all powered by human beings. The film will be followed by a panel debate with creative thinkers from the world of politics, journalism, science, art and technology.

7.30pm | 2 hours  
£5 | Edinburgh Centre for Carbon Innovation

FRIDAY

8 APRIL

# Full spectrum

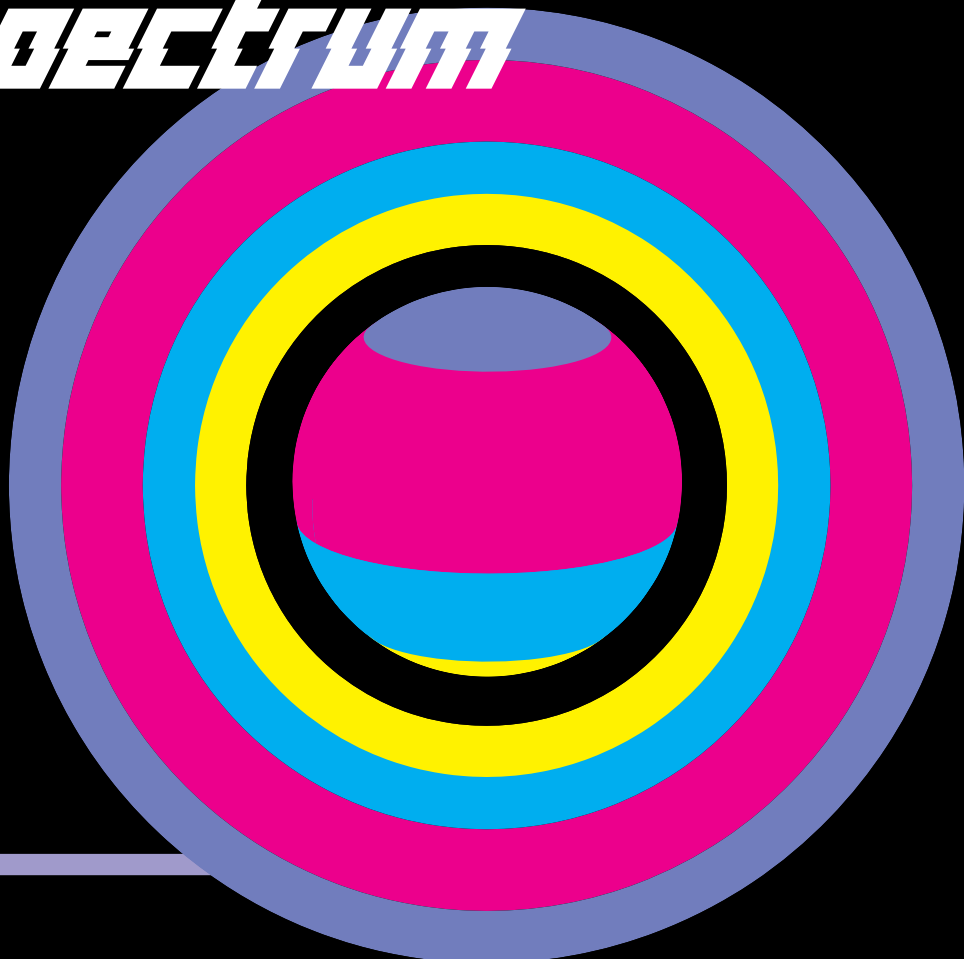
SPECIAL EVENT

AGES 18+



Following its sell out first year, our Science Festival club night will this year bring together DJs and tech wizardry to fine-tune this legendary late night experience. DJs **Astrojazz** and **Main Ingredient** will get the floor moving, while digital artworks from **Unstable Creations**, bespoke visuals from **Bright Side Studios** and audience responsive rave aids will keep you dancing through the night. More acts are still to be announced – keep an eye on our website: [sciencefestival.co.uk](http://sciencefestival.co.uk) for details.

10pm | 5 hours  
£11/£9 | Summerhall | Dissection Room



DISCUSSION



### SYMMETRIES IN LIGHT: THE LIFE AND WORK OF DAVID BREWSTER

Invented 200 years ago by Scottish scientist Sir David Brewster, the kaleidoscope was one of the must have toys of the 1800's and this fascinating gadget is still popular today. Join us to learn about the life and work of Sir Brewster, one of the founding figures in physics in the mid-nineteenth century, and find out why his discoveries are still relevant today.

6pm | 1 hour

£5 | Playfair Library

Presented by the University of Edinburgh

DISCUSSION



SCIENCE AND CULTURE

### MORE THAN A GAME: MATHEMATICAL ADVENTURES IN THE BEAUTIFUL GAME

Football is riddled with numbers, patterns and shapes. What's the similarity between an ant colony and Total Football, Dutch style? How is the Barcelona midfield linked geometrically? The answer lies in the world of mathematical modelling, expressed brilliantly by David Sumpter through the prism of football in his thrilling book *Soccermathics*. Join us to hear David in conversation with ex-footballer Pat Nevin to look at the fascinating area where maths and football collide.

8pm | 90 mins

£8.50/£6.50/#SciPals students £4.25

National Museum of Scotland | Auditorium

TOUR



### NATIONAL MUSEUMS COLLECTION CENTRE TOURS

Ever wondered about what happens behind the scenes at National Museums Scotland? On this guided tour you'll visit the new 'state of the art' research facility for the museums' Natural Sciences collections, home to over 10 million specimens, and learn about how they care for their internationally important collections. Limited places available.

10am, 11.45am and 2pm | 75 mins

on until Saturday 9 April

£6/£5 | National Museums Collection Centre

Presented by National Museums Scotland

WORKSHOP



### MAKE A SILVER RING

Have a taste of jewellery making by creating your own silver ring with jeweller Scarlett Erskine. Learn basic skills of saw piercing, texturing and soldering metal by making your own silver ring to take home.

2.30pm and 6.30pm | 2 hours

£30 | Summerhall | Basement Gallery 1

# The Reading Experiment

*The Reading Experiment* returns as part of the 2016 Science Festival to reunite the worlds of science and words. We're bringing together the very best writers in an exciting range of events which dive into the creative nexus where these two genres meet.

This year we see the return of our popular *Very Short Introduction* strand, a series of author-led events giving you the perfect introductory insight into a variety of fascinating topics such as forensic science, sound, stars and psychotherapy. Get your short, accessible kick from these expert authors who are ready to whet your appetite for science and words.

There's a chance to live out your Willy Wonka fantasies with our Golden Ticket competition, running with Edinburgh City Libraries. If you borrow any of the books on our special science reading list, you could be our lucky Golden Ticket winner and will be rewarded with a pair of tickets to the *Big Bang Bash*. Visit our website to find the reading list and visit your local Edinburgh City Library to get borrowing today!

Look out for our Reading Experiment tags on our events listings throughout the brochure. We'll be bringing you reading lists and recommendations so that you can get inspired to start your own reading experiment and delve into science writing in all its forms. Keep an eye on our website to keep up to date with these literary extras and follow us on twitter for updates.





ACTIVITY

### THE BLOOD DOCTOR

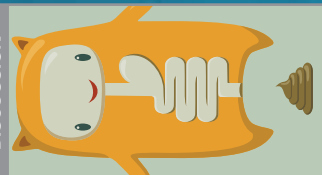
Join Haemophilia Scotland, Blackwell's and forensic artist **Gillian Taylor** to solve *The Blood Doctor* mystery. As morning breaks on South Bridge, Blackwell's staff come in to discover a body in the bookshop. This area of Blackwell's is now a suspected crime scene, open to you, our Science Festival detectives. During the investigation, your job will be to establish murderer, motive and weapon. Join us to examine the crime scene, exploring rare blood disorders and learning how blood stains can be used to solve crimes.



ACTIVITY

### BIKES VS CARS FUTURE VEHICLE SHOWCASE

Edinburgh Centre for Carbon Innovation, the UK's leading hub for low carbon ideas, give you the chance to explore new low carbon technologies, vehicles and ideas with a full day event at their award winning, low carbon hub. Explore display stands, new technologies and a series of lectures and discussions looking at how and why electric vehicles are an important part of our future mobility.



DISCUSSION

BEING HUMAN

### GUT FEELING

Discover the important role your gut plays in your overall health. **Prof Adam Hart**, author of *The Life of Poo*, will chair this fascinating panel event, supported by the British Society for Immunology, featuring immunologist **Prof Fiona Powrie** and microbiologist **Dr Lindsay Hall**. You'll be introduced to bacterial biology and the immune system, followed by a discussion on the latest research connecting gut bacteria with inflammatory bowel disease, Crohn's disease, asthma, eczema and even mental health.

SATURDAY

9 APRIL

10am, 12pm, 3pm | 90 mins

Free (ticket required) | Blackwells Bookshop

Presented by Haemophilia Scotland

11am-5pm | drop-in

Free | Edinburgh Centre for Carbon Innovation

12.30pm | 90 mins

£8.50/£6.50/#SciPals students £4.25

National Museum of Scotland | Auditorium

SPECIAL EVENT

## Edinburgh Mini Maker Faire®



The *Edinburgh Mini Maker Faire* is back for its fourth year, highlighting the diversity of human creativity by bringing together makers from all sorts of unexpected areas under one big roof. This year we're better than ever before and you'll be treated to gadgets, hardware, software, knitwear and food. This is your chance to come out and interact with unbelievable technology and discover the hidden gems that are worked away at by creative makers across the country.



SUNDAY

10 APRIL

10am-5pm | drop-in

£6/under 3s free | Throughout Summerhall

Edinburgh Mini Maker Faire is independently organised and operated under licence from Maker Media Inc

Supported by Headline Sponsor

**Make:**  
makezine.com

**SIEMENS**

DISCUSSION



## BATTLEFIELD PATHOLOGY IN THE FIRST WORLD WAR

In the First World War, flamethrowers and poison gas were used on a large scale for the first time. The new injuries created by this new weaponry were accompanied by a remarkable co-evolution of surgical practice and treatments. **Prof Ken Donaldson** will discuss the main types of battlefield wounds and the tissue injury, repair and infection that resulted.

Warning: This talk will show graphic images of wounds and their consequences which some people may find distressing.

2pm | 1 hour

Free (ticket required)

The Scottish Parliament Education Room

Edinburgh Zoo | 4pm | SCIENCE NIGHT AT THE ZOO (See page 29)

SHOW



## 2071: THE WORLD WE'LL LEAVE OUR GRANDCHILDREN

World leaders agree that climate change presents humans with one of our most difficult challenges. Momentum for change is building, but not at the scale or pace that climate science shows are necessary. Delivered by **Prof Chris Rapley**, one of the world's leading climate scientists, *2071: The World We'll Leave Our Grandchildren* is a one-man play about our climate: how it has changed in the past, how and why it is changing now, and the need for humanity to act to avoid dangerous disruption in the future.

3pm | 1 hour

£8.50/£6.50/#SciPals students £4.25

National Museum of Scotland | Auditorium

Presented by John Murray Press

A Planetary Perspective events are supported by Greener Scotland

DISCUSSION



## ELECTRIC AUTOMOTIVE ADVENTURES WITH ROBERT LLEWELLYN

Join **Robert Llewellyn** – actor, comedian, writer and star of hit Fringe show *Electric Cars are Rubbish. Aren't They?* – as he makes a special stop at ECCI, the UK's leading hub for low carbon ideas, to recharge his batteries and share stories of his electric automotive adventures.

3.30pm | 90 mins

£5 | Edinburgh Centre for Carbon Innovation

DISCUSSION



## INSPIRED BY NATURE

Nature has been perfecting solutions to problems since life began 4.1 billion years ago. The results of natural selection have already inspired our innovation and creativity. Now we need to look to nature again if we are to invent elegant manufacturing solutions for a sustainable future. Join **Prof Thomas Speck** from the Botanic Gardens of Freiburg and **Dr Kalina Raskin** from CEEBIO (the first European Excellence Centre dedicated to Biomimicry) to discuss developments in biomimetics.

7pm | 90 mins

£8/£6/#SciPals students £4

Royal Botanic Garden Edinburgh Lecture Theatre

In association with Heriot-Watt University

DISCUSSION



## THE SERENGETI RULES: THE QUEST TO DISCOVER HOW LIFE WORKS

How does life work? How does nature produce the right number of zebras and lions on the African savanna, or fish in the ocean? How do our bodies produce the right numbers of cells? Join award winning biologist and author of *The Serengeti Rules*, **Prof Sean B Carroll** to hear the stories of the pioneering scientists who sought the answers to simple yet profoundly important questions and learn how their discoveries matter for our health and the health of our planet.

12.30pm | 90 mins

£8.50/£6.50/#SciPals students £4.25

National Museum of Scotland | Auditorium

DISCUSSION



## LIFE IN THE EXTREMES

Our planet has an amazing variety of extreme environments, from the hottest deserts that can reach a baking 70°C to the deepest point in our oceans, a staggering seven miles down from the surface. Join us for three engaging talks on the different aspects of *Life in the Extremes*, looking at its importance in our soils, what it tells us about early life on the planet and whether life might exist elsewhere in the Universe.

3pm | 90 mins

£8.50/£6.50/#SciPals students £4.25

National Museum of Scotland | Auditorium

Presented by the Scottish Consortium for Rural Research

DISCUSSION



## TAM DALYELL PRIZE LECTURE

In this year's Tam Dalyell lecture, **Prof Sethu Vijayakumar**, Professor of Robotics and Director of the Edinburgh Centre for Robotics, looks at how humans and robots will work together in the future. The next generation of robots will work much more closely with humans, other robots and interact significantly with the environment around it. With significant autonomy devolved to the robotic platforms, will we be able to share control in a way we are comfortable with? Sethu will highlight the impact in domains ranging from self-driving cars, mining, shared manufacturing, to prosthetics and rehabilitation.

6pm | 90 mins

Free (ticket required) | Playfair Library Playfair Library

Presented by The University of Edinburgh



READING EXPERIMENT | A PLANETARY PERSPECTIVE

BEYOND PLANET EARTH | A PLANETARY PERSPECTIVE

SCIENCE AND CULTURE

Supported by



# BOOKING INFORMATION

## ONLINE

[sciencefestival.co.uk](http://sciencefestival.co.uk)

## PHONE

0844 557 2686  
Tuesday 9 February–Friday  
25 March:  
10.30am–5.30pm (Monday–Friday)  
11am–5pm (Saturday)  
Saturday 26 March–Sunday  
10 April:  
8.30am–6pm (Monday–Saturday)  
11am–4pm (Sunday)

## 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.

## GROUP DISCOUNTS

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

## CONCESSIONS

Unless otherwise stated, concessions are available for pensioners, the unemployed and disabled persons (with a complimentary ticket available for their carers – please book this by phone or in person at our Box Office). Proof of status may be required.  
Students! Lets be #SciPals – you can get half price tickets for most of our adult events. See full information on p.34.

## REFUNDS

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

## ACCESSIBILITY

If you would like a copy of the brochure in a different format contact [marketing@scifest.co.uk](mailto:marketing@scifest.co.uk) or call 0131 553 0320. 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.

# 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.

## BY BUS

See the venue map on the opposite page for bus listings to each of our venues. Please visit [lothianbuses.com](http://lothianbuses.com) or call 0131 555 6363 for further information.

## BY TRAIN

For train travel in Scotland and tickets, visit [scotrail.co.uk](http://scotrail.co.uk). For National Rail enquiries, see [nationalrail.co.uk](http://nationalrail.co.uk) or call 08457 48 49 50.

## BY BIKE

Plan your journey at [cyclestreets.net](http://cyclestreets.net).

## 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](http://visitscotland.com).

# 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.

## STAFF

### DIRECTORS

Simon Gage  
Director  
Amanda Tyndall  
Creative Director  
Darrell Williams  
Chief Operating Officer

### COMMUNICATIONS

Emma Pirie  
Marketing and Communications Manager (maternity leave)  
Owen O'Leary  
Marketing and Communications Manager  
Joshua Smythe  
Graphic Design  
Vikki Jones  
Senior Communications Officer (maternity leave)  
Laura Bain  
Communications Officer  
Hannah Wright  
Communications Officer  
Charlotte Gosling  
Press Officer

### CREATIVE

Eilidh Dunnet  
Senior Events Developer  
Augusta Macdonald  
Senior Events Developer  
Laura McLister  
Senior Events Developer (maternity leave)  
Matthew Wright  
Senior Events Developer  
Kate Chapple  
Events Developer  
Sean Elliott  
Events Developer  
Terence Finnegan  
Events Developer  
Siân Hickson  
Events Developer  
Andrew Jeffrey  
Events Developer  
Craig Smith  
Events Developer  
Sarah Thomas  
Events Developer  
Alice Russell  
Festival Project Assistant

### DEVELOPMENT

Juliet Tweedie  
Development Manager  
Danielle Lynch  
Senior Development Officer  
Hazel Smith  
Development  
Kraig Brown  
Development Officer  
Kathleen Glancy  
Development Officer  
James Strong  
Development Officer

### EDUCATION

Joan Davidson  
Education Manager  
Patrick Campbell  
Education Coordinator  
Niall Heseltine  
Education Sales Assistant  
Eliza Scriven  
Education Sales Assistant

### FINANCE AND ADMINISTRATION

Carolyn Wilson  
Finance Manager  
Cindy Cunningham  
HR Manager  
Tasmin Campbell  
Accounts Assistant  
Fiona Holt  
Accounts Assistant  
Amy Russell  
PA to the Directors

### OPERATIONS

Oli Melia  
Head of Operations  
Amy Elder  
Production Manager  
Debbie Howard  
Production Manager  
Sarah O'Connor  
Production Officer

### PROJECTS AND PLANNING

Gill Duncan  
Senior Projects Manager  
Bill Addison  
Project Officer

Edinburgh International Science Festival also employs around 150 additional staff to deliver its projects throughout the year.

### BOARD OF DIRECTORS

David Milne (Chair)  
Rev Ewan Aitken  
Prof Polly Arnold  
Clr Angela Blacklock  
Clr Karen Doran  
Prof Michael Fourman  
Clr Alex Lunn  
Prof Stuart Munro  
Prof Ian Ritchie  
Dawn Robertson  
Clr Cameron Rose  
Prof Ian Wall  
Philip Young  
Sandra Elgin (Observer)

### SCIENCE FESTIVAL ADVISORY GROUP

Hermione Cockburn  
Broadcaster  
Brian Cox  
University of Manchester  
Quentin Cooper  
Broadcaster  
Ken MacLeod  
Sci-fi writer  
Ian Sample  
The Guardian  
Nigel Townsend  
Theatre Director  
Richard Wiseman  
The University of Hertfordshire



Edinburgh is the world's Festival City with events happening all year round. Visit [edinburghfestivalcity.com](http://edinburghfestivalcity.com) for news and images from Edinburgh's twelve major festivals, plus festival history, information on the city and tips on planning your visit.

**Imagine Festival**  
28 May–5 June 2016  
[imagine.org.uk](http://imagine.org.uk)

**Edinburgh International Film Festival**  
15–26 June 2016  
[edfilmfest.org.uk](http://edfilmfest.org.uk)

**Edinburgh Jazz and Blues Festival**  
15–24 July 2016  
[edinburghjazzfestival.com](http://edinburghjazzfestival.com)

**Edinburgh Art Festival**  
28 July–28 August 2016  
[edinburghartfestival.com](http://edinburghartfestival.com)

**Royal Edinburgh Military Tattoo**  
5–27 August 2016  
[edintattoo.co.uk](http://edintattoo.co.uk)

**Edinburgh International Festival**  
5–29 August 2016  
[eif.co.uk](http://eif.co.uk)

**Edinburgh Festival Fringe**  
5–29 August 2016  
[edfringe.com](http://edfringe.com)

**Edinburgh International Book Festival**  
13–29 August 2016  
[edbookfest.co.uk](http://edbookfest.co.uk)

**Edinburgh Mela**  
27–28 August 2016  
[edinburgh-mela.co.uk](http://edinburgh-mela.co.uk)

**Scottish International Storytelling Festival**  
21–30 October 2016  
[scottishstorytellingcentre.co.uk](http://scottishstorytellingcentre.co.uk)

**Edinburgh's Hogmanay**  
30 December 2016–1 January 2017  
[edinburghshogmanay.com](http://edinburghshogmanay.com)

**Edinburgh International Science Festival**  
1–16 April 2017  
[sciencefestival.co.uk](http://sciencefestival.co.uk)

BACK COVER: EDINBURGH MINI MAKER  
FAIRE PHOTOGRAPHY BY JOSHUA SMYTHE,  
MODEL DANIELLE LYNCH AND ARCHIE BY  
REDROBOTICS.CO SHOT ON LOCATION AT  
PROCESS STUDIOS.

# SCIENCE FESTIVAL VENUES 2016



- 1 The Banshee Labyrinth (29-35 Niddry Street, Edinburgh, EH1 1LG) Lothian Buses: 3, 5, 7, 8, 14, 29, 30, 31, 33, 35, 37, 45, 49
- 2 Blackwell's Bookshop (53-59 South Bridge, Edinburgh, EH1 1YS) Lothian Buses: 3, 5, 7, 8, 14, 29, 30, 31, 33, 35, 37, 45, 49
- 3 The Centre, Livingston (Almondvale Boulevard, Livingston, EH54 6HR) First Bus Service: 21, 22, 27, 28
- 4 City Art Centre (2 Market Street, Edinburgh, EH1 1DE) Lothian Buses: 5, 7, 8, 1, 45, 49
- 5 City Chambers (253 High St, Edinburgh, EH1 1YJ) Lothian Buses: 3, 5, 7, 8, 14, 23, 27, 29, 30, 31, 33, 35, 37, 41, 42, 45, 49, 67
- 6 Dynamic Earth (112-116 Holyrood Road, Edinburgh, EH8 8AS) Lothian Buses: 6, 35, 60
- 7 Edinburgh Centre for Carbon Innovation (High School Yards, Infirmary Street, Edinburgh, WH1 1LZ) Lothian Buses: 3, 5, 7, 8, 14, 29, 30, 31, 33, 35, 37, 45, 49
- 8 Edinburgh Printmakers (23 Union Street, Edinburgh, EH1 3LR) Lothian Buses: 1, 4, 5, 7, 8, 10, 11, 12, 14, 16, 19, 22, 25, 26, 34, 44, 45
- 9 Filmhouse (88 Lothian Road, Edinburgh, EH3 9BZ) Lothian Buses: 1, 2, 10, 11, 15, 16, 24, 34, 35, 36, 47
- 10 Grassmarket (Edinburgh, EH1 2JU) Lothian Buses: 2
- 11 Jupiter Arland (Bonnington House Steadings, Wilkieston, EH27 8BB) First Bus Service: 27, X27
- 12 The Mound Precinct (Edinburgh, EH2 2EL) Lothian Buses: 3, 6, 10, 11, 12, 16, 23, 25, 26, 27, 31, 33, 41, 42, 101, 102, 106, 124, tram
- 13 National Library of Scotland (57 George IV Bridge, Edinburgh, EH1 1EW) Lothian Buses: 23, 27, 41, 42
- 14 National Museum of Flight (East Fortune Airfield, East Lothian, EH39 5LF) Eve Coaches Service: 121
- 15 National Museum of Scotland (Chambers Street, Edinburgh, EH1 1JF) Lothian Buses: 2, 23, 27, 35, 41, 42, 45, 47, 67
- 16 National Museums Collection Centre (242 West Granton Road, Granton, Edinburgh EH5 1JA) Lothian Buses: 8, 16, 32
- 17 Playfair Library (Old College, University of Edinburgh, South Bridge, EH8 9YL) Lothian Buses: 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) Lothian Buses: 2, 3, 5, 7, 8, 29, 30, 31, 33, 37, 47, 49
- 19 Royal Botanic Garden Edinburgh (Inverleith Row, Edinburgh, EH3 5LR) Lothian Buses: 8, 23, 27
- 20 Royal College of Physicians (9 Queen Street, Edinburgh, EH2 1JQ) Lothian Buses: 10, 11, 12, 16, 26, 44
- 21 RZSS Edinburgh Zoo (134 Corstorphine Road, Edinburgh, EH12 6TS) Lothian Buses: 12, 26, 31, 100
- 22 Scottish National Gallery of Modern Art (75 Belford Rd, Edinburgh EH4 3DR) Lothian Buses: 13
- 23 The Scottish Parliament (Edinburgh, EH99 1SP) Lothian Buses: 6, 35, 60
- 24 Scottish Seabird Centre (The Harbour, North Berwick, EH39 4SS) First Bus Service: 124, X24
- 25 St Giles Cathedral (High Street, Edinburgh, EH1 1RE) Lothian Buses: 3, 5, 7, 8, 14, 23, 27, 29, 30, 31, 33, 35, 37, 41, 42, 45, 49, 67
- 26 Summerhall (1 Summerhall, Edinburgh, EH9 1PL) Lothian Buses: 41, 42, 67
- 27 Surgeons' Hall Museum (Nicolson Street, Edinburgh, EH8 9DW) Lothian Buses: 2, 3, 5, 7, 8, 14, 29, 30, 31, 33, 37, 41, 42, 47, 49, 67
- 28 Talbot Rice Gallery (Old College, South Bridge, Edinburgh, EH8 9YL) Lothian Buses: 3, 5, 7, 8, 14, 29, 30, 31, 33, 35, 37, 45, 49

# Edinburgh Mini Maker Faire®

10 APRIL 10am–5pm  
SUMMERHALL

SEE CREATIVITY COME TO LIFE

Robotics • 3D printing • Tech

Gadgets • Craft • Gaming • Zines • Food



Supported by

Book NOW: [sciencefestival.co.uk](http://sciencefestival.co.uk)

Edinburgh Mini Maker Faire is independently organised and  
operated under licence from Maker Media Inc

Supported by Headline Sponsor

Supported by

**Make:**  
makezine.com

**SIEMENS**

**dialog**  
SEMICONDUCTOR