

 **EDINBURGH
SCIENCE
FESTIVAL**


edf
ENERGY



**6-21
APRIL
2019**

**#ED
SCI
FEST**

Registered Charity no. SC003790

ONLINE BOOKING: SCIENCEFESTIVAL.CO.UK

BOOKING HOTLINE: 0131 226 0005

WITH SPECIAL THANKS TO ALL OUR SUPPORTERS

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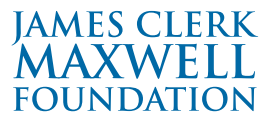
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JOIN US AT THE FRONTIER

"We choose to go to the moon. We choose to go to the moon in this decade and do the other things, not because they are easy, but because they are hard, because that goal will serve to organize and measure the best of our energies and skills, because that challenge is one that we are willing to accept, one we are unwilling to postpone, and one which we intend to win."

John F Kennedy

Rice University, September 12, 1962

50 years ago Neil Armstrong and Buzz Aldrin became the first humans to set foot on a celestial body beyond Earth. Homo sapiens walked on the Moon and, almost in an instant, our horizons expanded like never before. In honour of this breaking of completely new ground Edinburgh Science Festival takes *Frontiers* as the theme of its 31st edition.

At the heart of all science lies an unquenchable curiosity; a deep urge to explore and explain the unknown and to push the frontiers of our knowledge about ourselves, the world around us and our place in the wider Universe.

From the depths of the oceans to the furthest reaches of space and the intricate pathways of the human brain, the 2019 Festival explores the cutting edge of science and technology of all sorts.

We celebrate the ideas and the individuals that are expanding our collective knowledge; pushing the boundaries that define our sense of the 'known', to reveal ever more about the 'unknown'. With new venues and partners and a programme packed full of inspiring events for the science-curious of all ages.

Embrace this spirit of adventure and enquiry and join us from 6-21 April as we take some small steps into favoured familiar territories and some giant leaps in some new and exciting directions.

Amanda Tyndall

Amanda Tyndall
Festival and Creative Director



EVENTS FOR FAMILIES

[P.8-29]

Join us for exciting, engaging and educational events and activities the whole family can enjoy. Events are listed by date and then by venue, with recurring events highlighted each day.

Most family events carry a minimum age recommendation and, to ensure the best possible experience for all our visitors, we ask parents to bear these in mind when choosing events for their children.

ADMIT ONE 1

EVENTS FOR ADULTS

[P.32-57]

Our programme of events for adults includes discussions, debates, workshops, screenings and nights out, all with a scientific twist. Events are listed by date and then by time.

Most of our adult events are designed for audiences aged 14+, unless an age restriction or guideline is listed. This is a recommendation only and younger audiences are welcome, except where marked. Please note that all events where alcohol is served will be marked AGES 18+ due to licensing restrictions. Under 18s cannot be admitted to these events and proof of age may be required.

Reduced Price Tickets

For our family events that offer a reduced price for three tickets or more, this must include at least one child under the age of 16. Students and teachers can also take advantage of our #scifive discount: see p.37 for more details.

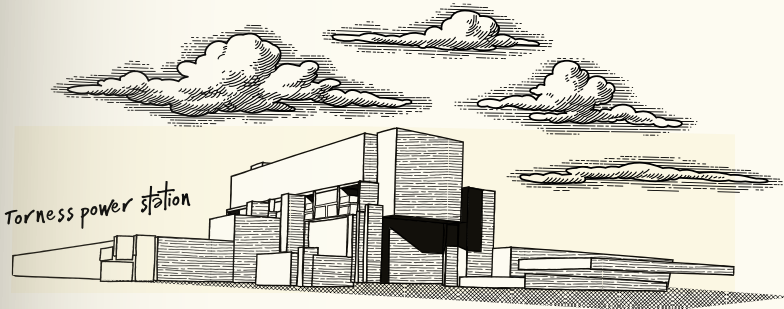
FESTIVAL F OUTP



PLEASANCE

Where To Find the Science Festival (P.6-7)

Each Easter, we transform spaces in and around Edinburgh into Science Festival hubs for discussion, debate, experimentation and discovery. In 2019, you'll find our programme of events at City Art Centre, the National Museum of Scotland, Pleasance, Royal Botanic Garden Edinburgh, Summerhall, Dynamic Earth and more.



EDINBURGH SCIENCE FESTIVAL POWERED BY EDF ENERGY

EDF Energy is proud to power Edinburgh Science Festival and its *Generation Science* primary schools' touring programme. This headline partnership is part of our wider commitment to science, technology, engineering and mathematics (STEM) education in Scotland.



As well as being Scotland's largest producer of low carbon electricity, EDF Energy is investing in engaging and inspiring the next generation of Scottish minds.

Each year, EDF Energy welcomes thousands of school children through the doors of our visitor centres at Hunterston B and Torness, where our guides talk them through how electricity is made before taking them on a tour to the heart of the power station.

We also support SmartSTEMs; an outreach initiative that aims to link industry with education. Since the start of the partnership, we've inspired more than 3,000 young people across Scotland to enter into a career in STEM.

During the Festival, you'll find us at the City Art Centre with our *Energy Makers* wind turbine workshop open to children aged five and above. Back by popular demand, from 13-21 April, is our *Inside a Nuclear Reactor* film that allows you to shrink to the size of an atom and journey with EDF Energy to the core of a nuclear reactor.

We hope you and your family have a great Festival and enjoy the wealth of activities that are available.

FRONTIER POSTS

NATIONAL MUSEUM
OF SCOTLAND



DYNAMIC EARTH



SUMMERHALL

ROYAL BOTANIC
GARDEN EDINBURGH



CITY ART
CENTRE



Useful information (p.58)

Turn to the back of this brochure for more information about booking tickets, Festival venues and more information about Edinburgh Science Festival.

Visit CITY ART CENTRE

2 MARKET STREET, EDINBURGH, EH1 1DE

WHAT'S ON?

Workshops and activities for children and families. A day pass allows you to access all events.

OPEN SATURDAY 6 APRIL – SATURDAY 20 APRIL (NOT SUNDAYS), 9.30AM – 4.30PM

During the Science Festival we transform City Art Centre's gallery spaces into a sensational science playground for families, packed with workshops, shows and interactive activities.



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 their headquarters in Austin, Texas and major facilities in Edinburgh, London and Newbury in the UK, Cirrus Logic connects us with the world to deliver a great audio experience. Make your voice heard – through Cirrus Logic technology.



cirrus.com

Visit ROYAL BOTANIC GARDEN EDINBURGH

INVERLEITH ROW, EDINBURGH, EH3 5LR

WHAT'S ON?

Interactive activities for families.

Times and dates vary, see event listings for details.

OPEN SATURDAY 6 APRIL – SUNDAY 21 APRIL, 10AM – 6PM

The Botanic Garden is a world-renowned centre for plant science and education, aiming to explore, conserve and explain the world of plants for a better future. Working as part of the SEFARI collective of Scottish Environment, Food and Agriculture Research Institutes the Garden offers a programme of family-friendly activities reflecting current research.

Look out for the series of food-themed talks that are part of the Garden's Food Forever exhibition exploring the role of plant and animal diversity in securing the future of food production.



Royal Botanic Garden Edinburgh

SEFARI

Visit DYNAMIC EARTH

112-116 HOLYROOD ROAD, EDINBURGH, EH8 8AS

WHAT'S ON?

Interactive exhibits and events for families. Times and dates vary, see event listings for details.

OPEN SATURDAY 6 APRIL – SUNDAY 21 APRIL, 10AM – 5.30PM

Discover a world of incredible experiences at Dynamic Earth and embark on the interactive adventure of a lifetime as you travel through space and time in this multisensory exhibition.

During the Science Festival, you can take part in exciting hands-on activities, workshops and talks or sit back and relax in our popular Science Festival Dome Nights. Join us to explore the last frontier of planet Earth: the ocean. Meet scientists, conservationists and artists and learn more about this amazing environment from our local shorelines to the cold, dark depths.



Visit SUMMERHALL

SUMMERHALL PLACE, EDINBURGH, EH9 1PL

WHAT'S ON?

Art exhibitions, bookable talks and interactive events for families and adults. Times and dates vary, see event listings for details.

OPEN SATURDAY 6 APRIL – SUNDAY 21 APRIL, 11AM – 11PM

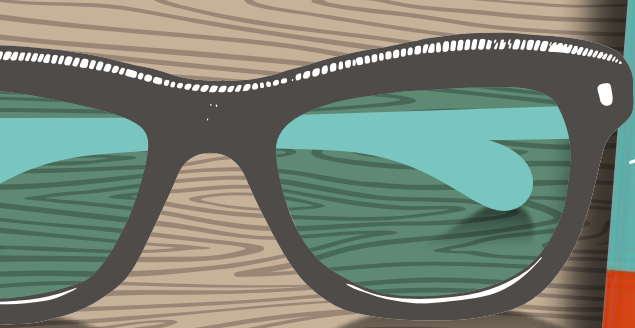
The former Royal Dick School of Veterinary Studies is now a major creative venue for the arts with a host of studio and workshop spaces. During the Science Festival you'll find art exhibitions, artist talks, theatre and tours all under one roof.

Enjoy the history of Pickering's Gin in *The Science of Gin and Tonic*, take in artist talks from Louise Mackenzie, Russell Beard, Stephen Kavanagh and Aurélie Fontan or watch the return of sell-out Fringe show EGG about IVF and egg donation.



SUMMERHALL
Open Minds Open Doors





Visit PLEASANCE

60 PLEASANCE, EDINBURGH, EH8 9TJ

WHAT'S ON?

Free drop-in activities and an outdoor exhibition for families and adults. Shows and activities for families and young people, discussions, debates and interactive events for adults. Times and dates vary, see event listings for details.

OPEN SATURDAY 6 APRIL – SUNDAY 14 APRIL, 10AM – 11PM

Pleasance is one of Edinburgh's best-loved festival venues and this year Edinburgh Science Festival can be found serving science, innovation and creativity across its spaces. Our time-travelling police boxes *Moments in Time* will be in the courtyard for the duration of the Festival and our special hands-on science zone *The Experimentarium* will be running Tuesday 9 – Wednesday 10 April.



VENUE SPONSOR

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



Investment managers

bailliegifford.com

Visit NATIONAL MUSEUM OF SCOTLAND

CHAMBERS STREET, EDINBURGH, EH1 1JF

WHAT'S ON?

Free drop-in activities, workshops and exhibitions for families and adults. Bookable workshops, talks and shows for all ages. Times and dates vary, see event listings for details.

**OPEN SATURDAY 6 APRIL – SUNDAY 21 APRIL
10AM – 5PM AND EVENINGS FOR EVENTS**

One of Edinburgh's most iconic buildings, the National Museum of Scotland houses treasures from around the world, all under one roof. During the Science Festival you'll find special events and exhibits for all ages. There are also bookable shows and workshops.

In the evenings, don't miss our exciting programme of discussions and debates. From debunking myths of *The Gendered Brain* to *The Future of Cyber Security, Data and AI*, we're exploring a huge range of key issues.



National Museum of Scotland



THE UNIVERSITY of EDINBURGH

AROUND EDINBURGH

Alongside our core venues, you'll find a vast and varied selection of events during the Festival at venues around the city and beyond – the perfect solution for an inspiring scientific day (or night!) out.

You'll find a full list of venues and more information on our website at sciencefestival.co.uk/venues

FACILITIES AND ACCESS

- Wheelchair access throughout
- Elevator
- Ramp access
- Level access throughout
- Accessible toilet
- Changing places toilet
- Lowered counters
- Access aware staff
- Hearing loop
- Exhibition transcripts
- Assistant dogs welcome
- Low lighting
- Mobility scooters and wheelchairs available to book in advance
- Cafe
- Bar
- Packed lunch area
- Water available
- Cloakroom
- Buggy park
- Baby changing
- Parking
- * Monday 8 April and Saturday 13 April only



STREET SCIENCE

ALL AGES
SHOW



AROUND EDINBURGH

TIMES VARY | DROP-IN | VARIOUS DATES THROUGHOUT THE FESTIVAL | FREE

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 in the run up to and during the Science Festival. Follow us on Twitter @EdSciFest for real-time updates.

Supported by



A HUMAN TOUCH

ALL AGES
EXHIBITION



THE SCOTTISH PARLIAMENT

DAILY | DROP-IN | WED 20 MARCH – WED 8 MAY | FREE

This stunning large-scale, open-air photography exhibition will take you on a fascinating journey exploring the effect of human activity on our planet, how modern practices are changing our landscapes and are impacting on the environment, and looking at some of the steps taken to cope with a rapidly changing world and dwindling resources. Learn about the urgency of environmental degradation and ways to make a difference.

In association with The Scottish Parliament

Images: Jassen Todorov

Supported by OCEANA Protecting the World's Oceans

VENUE SPONSOR:



CEN



CITY ART CENTRE

SAT 6–SAT 20 APRIL (NOT SUN)

9.30AM–4.30PM | ALLOW 4–5 HOURS FOR YOUR VISIT

£8 ADULT | £9.50 CHILD AGED 7+

£7 CHILD AGED 3–6 | FREE CHILD UNDER 3

£5 DISABLED | £5 REGISTERED UNEMPLOYED

(FOR EACH FAMILY MEMBER UP TO 6 PEOPLE, ID REQUIRED)

Ticket prices for City Art Centre include a voluntary 10% donation to support our work. For UK tax payers, this enables us to also claim Gift Aid. If you do not wish to make a charitable donation, the admission prices for City Art Centre are £7.20 adult/£8.65 child aged 7+ / £6.36 child aged 3–6

Edinburgh Science Festival at City Art Centre is the perfect, inspirational day out. Explore five-floors packed with shows, workshops and interactive events perfect for kids up to 12 years old. Parents can join in the fun too with drop-in workshops, *Science Mini Cinema* and City Art Centre's art exhibitions, *The Modelmakers* and *Art Meets Science*.

TETRACOLOURS

AGES 3+
ACTIVITY



CITY ART CENTRE

9.30AM–4.30PM | DROP-IN

Colourful creatures wanted for this fun creative shapes activity. Discover a world of new shapes, blend them together to stretch your imagination and create anything you can think of. You can even design tessellating patterns which could go on forever!

WEE WONDER WORLD

AGES 3+
ACTIVITY



CITY ART CENTRE

9.30AM–4.30PM | DROP-IN

Journey through our special space for smaller scientists. Explore why things float, enjoy story time with a scientific twist, construct a tremendous tower, build your own spinning toy or create a musical instrument. It's all possible with some simple science!

LITTLE GIANTS

AGES 3+
WORKSHOP



CITY ART CENTRE

10AM–4PM (HALF HOURLY) | 20 MINS

BOOKING REQUIRED

Buzzy the giant honeybee leads you into the wonderful world of bees in this delightful, interactive show. Learn how a bee's body is different from ours and find out how bees and flowers work in harmony together. Take a tour of a beehive, make pretty pollen-trail patterns and suck up nectar just like a real-life bee.

LITTLE SPARKS

AGES 5+
WORKSHOP



CITY ART CENTRE

10AM–4PM (HOURLY) | 45 MINS | **BOOKING REQUIRED**

Get stuck into circuits and discover what electricity does as we challenge you to create an electric-powered device! Start with a simple Electro Dough circuit, before advancing to the next level with a Snap Circuit board. Finish by using all the skills and knowledge you can muster to build a fantastic final electrical device!

SPLAT-TASTIC

AGES 5+
WORKSHOP



CITY ART CENTRE

10AM–4PM (HALF HOURLY) | 20 MINS

BOOKING REQUIRED

Get your goo on in this interactive chemistry workshop and design your very own slime. Test its thickness and stickiness under the extreme conditions of our *Splat-o-Meter* and check out how the appearance and properties of materials change when a chemical reaction takes place.

Supported by



ENERGY MAKERS

AGES 5+
WORKSHOP



CITY ART CENTRE

10AM–4PM (HOURLY) | 45 MINS | **BOOKING REQUIRED**

Discover the wonderful world of wind turbines! Learn how air can exert force and why the blades of a wind turbine spin. Get blown away by our awesome wind tunnel and chart the different speeds and directions of the wind. Finally, create your own turbines and test them in our tunnel in this great introduction to renewable energy!

Supported by



COLOUR INVESTIGATIONS

AGES 5+
WORKSHOP



CITY ART CENTRE

10AM–4PM (HALF HOURLY) | 20 MINS

BOOKING REQUIRED

Learn all about colours and how they are made by solving a mystery using chromatography to uncover which pen drew the missing trousers. Pop on your detective hat and predict which colours were mixed to create a new colour of felt-tip pen.

WILD VETS



AGES 5+

WORKSHOP
NEW

CITY ART CENTRE

10AM-4PM (HOURLY) | 45 MINS | BOOKING REQUIRED

Take on the role of an animal conservationist in our totally wild workshop. Discover more about Scottish wildlife heritage by exploring the animals that used to live here and the work being carried out to reintroduce animals - like the beaver - to Scotland!

Supported by



BLOOD BAR



AGES 7+

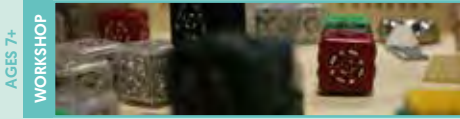
WORKSHOP

CITY ART CENTRE

9.30AM-4.30PM (HOURLY) | DROP-IN

Pull up a chair in our *Blood Bar* and be prepared for things to get gory! Have a go at making 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 cutting-edge technology. Take a closer look at the heart, lungs and oxygen in our *Don't Hold Your Breath* activity and find out what really happens when we get cuts and bruises in the *Scab Lab*.

ROBO CONSTRUCTORS



AGES 7+

WORKSHOP

CITY ART CENTRE

10AM-4PM (HOURLY) | 45 MINS | BOOKING REQUIRED

Welcome to the world of Cubelets! Building your own robot has never been easier - just snap the robot blocks together and let the magnetic faces do the rest. Become a mini-robot engineer in this fun, fast-paced workshop and create your own wacky and useful robots!

CUBESAT CREATOR



AGES 7+

WORKSHOP
NEW

CITY ART CENTRE

10AM-4PM (HOURLY) | 45 MINS | BOOKING REQUIRED

Ready, set, lift off! Come and build a CubeSat, a tiny satellite which can be used to carry out tasks in space. Decide what your device should include and what tasks it needs to undertake - then figure out the best place in space for your miniature machine to complete its mission.

GEO EXPLORERS



AGES 8+

WORKSHOP
NEW

CITY ART CENTRE

10AM-4PM (HOURLY) | 45 MINS | BOOKING REQUIRED

Be a geologist, an engineer or a driller to discover current and future methods of energy generation. Learn about oil and the methods used to find it and extract it from the Earth. Explore rock formations and ways of surveying the Earth and finally work together to construct a scale-model drilling rig.

ER SURGERY



AGES 8+

WORKSHOP

CITY ART CENTRE

10AM-4PM (HOURLY) | 45 MINS | BOOKING REQUIRED

Paging all surgeons to the emergency room - we need all hands on deck! Scrub up in the ER and help diagnose your 'patient', before performing life-saving surgery on the knee, abdomen and brain. Get involved using endoscopes supplied by Karl Storz - but be quick, every second counts! *Please note, this workshop is closed with no viewing area for parents.*



VIRTUAL WORLDS



AGES 10+

ACTIVITY

CITY ART CENTRE

9.30AM-4.30PM | DROP-IN

Warning - for intrepid explorers only! Transport yourself to another world through one of our fantastic virtual reality headsets! Ever wondered what it's like to walk on the Moon, or to stand in the middle of a piece of art you just created? Get a taste for adventure just by popping on a headset.

MARS MASTER CONSTRUCTORS



ALL AGES

ACTIVITY

CITY ART CENTRE

9.30AM-4.30PM | DROP-IN

Humanity's first Mars colony needs your help! Help by building pods, vehicles, labs and anything else you decide is important. Our team made a start but the rest is down to you for a successful move to our new home planet.

ZOOM BOX



ALL AGES

ACTIVITY

CITY ART CENTRE

9.30AM-4.30PM | DROP-IN

Zoom in, it's time to get up close with the world around you! Use your smartphone camera with our special microscope tables to get a closer look at scientific samples. Create your own *Zoom Box* and pair it up with your smartphone camera to create a microscope for you to take home.

SCIENCE MINI CINEMA



ALL AGES

ACTIVITY

CITY ART CENTRE

9.30AM-4.30PM | DROP-IN

Sit down, relax and enjoy our *Science Mini Cinema* where you can observe our world in a bit more detail. From slow motion to timelapse, explore the frontiers of science through a series of short films.

ART MEETS SCIENCE



ALL AGES

EXHIBITION

CITY ART CENTRE

9.30AM-4.30PM | DROP-IN | SAT 6-SAT 20 APRIL

(NOT ON SUN) | FREE WITH CITY ART CENTRE DAY PASS

For the first time a selection of works from the city's art collection, including a suite of prints by contemporary Scottish artists which explore the legacy of Edinburgh born scientist D'Arcy Wentworth Thompson (1860-1948). His pioneering theories on the growth of organisms inspired many artists as well as scientists. *Please note that City Art Centre is a family venue and as such adults are welcome to enjoy the exhibition while their children attend workshops and activities.*

Presented by City Art Centre

Image: Dalziel + Scullion, Primates, 2013 (City Art Centre, Museums & Galleries Edinburgh, © the artists)

THE MODELMAKERS

ALL AGES
EXHIBITION



CITY ART CENTRE

9.30AM-4.30PM | DROP-IN | SAT 6-SAT 20 APRIL
(NOT ON SUN) | FREE WITH CITY ART CENTRE DAY PASS

Edinburgh-based artist **John Brown** presents an exciting new exhibition that visualises various phenomena on a small scale. In each image, a 'modelmaker' is fabricating a miniature object or scene in order to elaborate on a scientific, technological, theoretical or political idea. The paintings also show the by-products of construction to recognise that the scene of fabrication is sometimes as interesting as the finished object.

Please note that City Art Centre is a family venue and as such adults are welcome to enjoy the exhibition while their children attend workshops and activities.

Presented by City Art Centre



CITY ART CENTRE

EARLY BIRD OFFER

Book over the phone or in person **before Monday 25 March** and get £1 off all day passes on Saturday 6, Monday 8 and Tuesday 9 April.

BOOKING YOUR CITY ART CENTRE DAY PASS

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. You can browse the events at City Art Centre below. 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. If you would like to discuss large group bookings for City Art Centre please call our Box Office on **0131 226 0005** and they will be happy to help you plan your visit.

GIFT AID SCHEME

Edinburgh Science Foundation, which runs Edinburgh Science Festival, is an educational charity. All ticket prices for City Art Centre include a voluntary 10% donation to support our work. For UK tax payers, this also allows us to reclaim the tax you pay through the Gift Aid Scheme; every pound you pay is worth £1.25 to us. If you do not wish to make a charitable donation, the admission prices for City Art Centre are as follows: £7.20 adults/£8.65 child aged 7+ / £6.36 child aged 3-6. For more information about our charitable work please see p.19 and p.24.

giftaid it

BOOKABLE WORKSHOPS SCHEDULE

Many of our events are available to drop into during your visit. However, some workshops 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.

AGE	START TIME	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 20 MINS														
5+	SPLAT-TASTIC 20 MINS														
5+	COLOUR INVESTIGATIONS 20 MINS														
5+	LITTLE SPARKS 45 MINS														
5+	WILD VETS 45 MINS														
5+	ENERGY MAKERS 45 MINS														
7+	CUBESAT CREATOR 45 MINS														
7+	ROBO CONSTRUCTORS 45 MINS														
8+	GEO EXPLORERS 45 MINS														
8+	ER SURGERY 45 MINS														

BUILD AND BREAK

ALL AGES
ACTIVITY

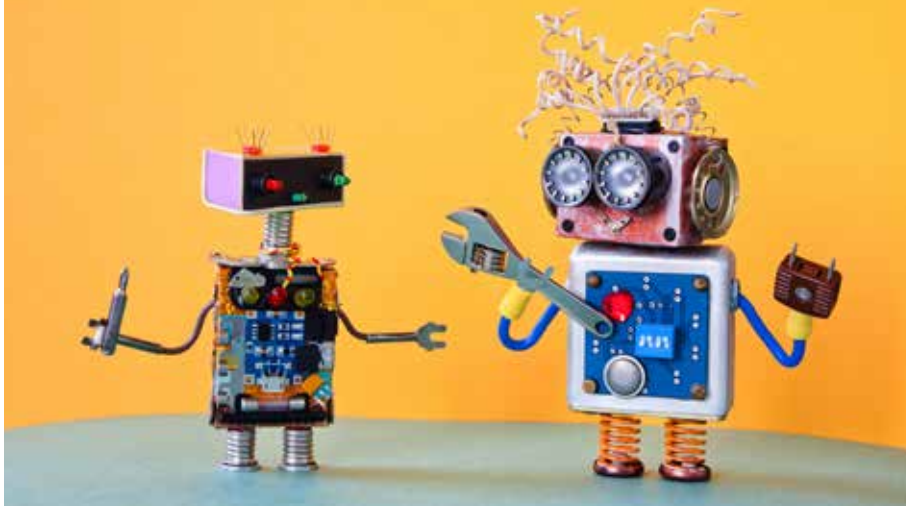


NATIONAL MUSEUM OF SCOTLAND | GRAND GALLERY

10AM–5PM | DROP-IN | ON UNTIL SUN 21 APRIL | FREE

Build, break and create in our unique free play session. Visit *BUILD IT* to unlock your creative spirit and build magical, massive structures with our super-sized construction blocks. Then head over to *BREAK IT* to be set loose on a huge pile of discarded electronics with a screwdriver and a pair of pliers – rip old pieces of tech apart to discover what they are made of and learn which parts we might be able to reuse. *Due to the nature of the activities, adult supervision is required. To provide an accessible environment for families with autistic children and children with complex sensory profiles we are hosting two early doors sessions at the National Museum of Scotland (p.26).*

Supported by



INTERACTIVE FAMILY DAY

ALL AGES
SPECIAL EVENT



THE SCOTTISH PARLIAMENT

10AM–4PM | DROP-IN | ALSO ON SAT 13 APRIL | FREE

Join us on an unrivalled adventure in science. Journey through space and discover the marvels of modern science through hands-on activities. Tour the Universe and explore the wonder of the night sky in an inflatable planetarium and enjoy interactive exhibits – from controlling lightning to seeing through a hole in your hand! You can also meet an astronomer, hold a meteorite, learn more about how Earth and space interact and lots more. Visit parliament.scot/science for more information.

Presented by The Scottish Parliament

#LITTERCUBES

AGES 8+
ACTIVITY



DYNAMIC EARTH | STRATOSPHERE

10AM–4PM | DROP-IN | ON UNTIL WED 10 APRIL

FREE WITH ADMISSION

Watch artist **Julia Barton** as she constructs her thought-provoking #LitterCUBES from litter collected on local beaches. Bring along collected plastic bottles or cotton-bud stems and help Julia with her work by washing, sorting and squashing bottles! Join us in asking: how did it get into our seas and on our beaches and what can we do to stop it getting there?

Presented by Dynamic Earth

EASTER TRAIL

AGES 3+
ACTIVITY



ROYAL BOTANIC GARDEN EDINBURGH

JOHN HOPE GATEWAY

10AM–4PM | DROP-IN | ON UNTIL SUN 21 APRIL | £2

TICKETS ON THE DOOR ONLY

Join the Botanic Bunny on a quest to explore new frontiers in our family Easter Trail! Complete the trail and receive your yummy Easter treat.

Presented by Royal Botanic Garden Edinburgh

BIO-DISCOVERIES

ALL AGES
ACTIVITY



NATIONAL MUSEUM OF SCOTLAND

LEARNING CENTRE LEVEL 2

10AM–4.30PM | DROP-IN | ON UNTIL WED 10 APRIL | FREE

Find out from our biologists what new things they've discovered this year about animals, plants and other living things. Get hands-on and make exciting discoveries yourself under the microscope!

Presented by The University of Edinburgh

MATHS: FRONTIERS OF IMAGINATION

ALL AGES
ACTIVITY



NATIONAL MUSEUM OF SCOTLAND

LEARNING CENTRE LEVEL 2

10AM–4.30PM | DROP-IN | ON UNTIL WED 10 APRIL | **FREE**

Put numbers to the test in this hands-on space exploration and discovery mission! Our mathematicians will help you navigate through the stars using computer simulations. Journey into the 4D world to see how maths predicts the orbit and location of the farthest planets.

Presented by The University of Edinburgh

POP-UP ENGINEERING

ALL AGES
ACTIVITY



NATIONAL MUSEUM OF SCOTLAND

LEARNING CENTRE LEVEL 2

10AM–4.30PM | DROP-IN | ON UNTIL WED 10 APRIL | **FREE**

Pop by to make your own cardboard pop-up! These ingenious engineering mechanisms can be customised and decorated to suit your personality. Choose your favourite design, transform it from a flat shape to a cool 3D model and then decorate it to take home.

Presented by The University of Edinburgh

CALORIE COUNTDOWN BIKE

ALL AGES
ACTIVITY



NATIONAL MUSEUM OF SCOTLAND

HAWTHORNDEN COURT

10AM–5PM | DROP-IN | ON UNTIL WED 10 APRIL | **FREE**

Join Food Standards Scotland to discover how long it takes to burn off a jelly baby whilst cycling. Explore the link between food intake and energy in this fun interactive bike activity.

Supported by



STEMS. BEND YOUR BRAIN

ALL AGES
ACTIVITY



NATIONAL MUSEUM OF SCOTLAND

HAWTHORNDEN COURT

10AM–5PM | DROP-IN | ON UNTIL FRI 12 APRIL | **FREE**

Come and play with our 3D Stems that are made to be incredibly flexible for mind-bending fun. Take the seeds of an idea, add curiosity and watch it grow as we discover what we can make with thousands of Stems. Enjoy the most exciting and puzzling conversation your hands will ever have with your brain and see what creations you can come up with.

MOMENTS IN TIME

ALL AGES
EXHIBITION



PLEASANCE | PLEASANCE COURTYARD

10AM–8PM | DROP-IN | SAT 6–SUN 14 APRIL | **FREE**

Allow yourself to be transported back in time as we take you on a journey through pivotal moments in Scotland's history. Through a series of immersive snapshots, discover milestones of Scottish scientific achievement from the flowering of philosophy and science during the Enlightenment, through the rapidly mechanising world of the Industrial Revolution, to the data-rich and globally connected Information Age.



LIFE UNDER THE LENS



AGES 8+
ACTIVITY

JUPITER ARTLAND

10.30AM | 2 HOURS | £20/£15

Join us on a fun-filled exploration of all things cellular. Become an art explorer and learn about cells on a macro and micro level. Take a tour of Jupiter Artland's artworks with the experts, then head to the classroom and explore cells through magnifying glasses. Inspired by the shapes, textures and patterns we find under the lens, create your own cellular art to take home. *Ticket prices include exclusive entry to the park outside of its open season.*

Presented by Jupiter Artland

FUTUREQUEST



AGES 5+
SHOW

PLEASANCE | QUAKER STUDIO

11AM | 1 HOUR | £6 OR £5 EACH FOR 3 OR MORE TICKETS

In a not-too-distant future, transport, schools, museums and everything else in the city of Edinburgh is managed by artificial intelligence. When it stops working one day, a team of volunteers is needed to enter the virtual reality world of *The Space* and solve the problem. Join science presenter **Neil Monteiro** for virtual games, interactive challenges and scientific demonstrations. You can save the city and learn about computer science at the same time!

PHYSICS WIZARDRY



AGES 7+
WORKSHOP

NATIONAL MUSEUM OF SCOTLAND

LEARNING CENTRE LEVEL 4, STUDIO 1

11AM AND 2PM | 1 HOUR | ON UNTIL MON 8 APRIL | £5

With the power of physics at our fingertips, learn how to make obscure potions with spectacular effects. Our Physics Wizards will explain the magic involved so that you too can become a Physics Wizard and impress your muggle friends and family. For ages 7-11. *Each ticket also admits one adult if required.*

Presented by The University of Edinburgh

ELECTRONIC MUSIC: BEGINNERS



AGES 7+
WORKSHOP

PLEASANCE | OCHIL ROOM

11AM | 90 MINS | £15

Discover how electronic circuits make noise and build one of your own. Learn how to solder components to a small, bagpipe-shaped circuit board and make your gadget play a little tune. No previous soldering experience required. *Adults may accompany young children for free but must buy a ticket if they wish to take part.*

Presented by MadLab Ltd

GAME ON!



AGES 8+
WORKSHOP

NATIONAL MUSEUM OF SCOTLAND

LEARNING CENTRE LEVEL 4 SEMINAR ROOM

12PM AND 3PM | 1 HOUR | ON UNTIL WED 10 APRIL | £5

A hands-on, playful introduction to computer programming. You will explore the exciting world of video games, learn the basics of coding in a visual programming language called Scratch and design and build your very own computer game! For ages 8-14. *Each ticket also admits one adult if required.*

Presented by The University of Edinburgh

EASY PEASY! REAL COOKING FOR KIDS



AGES 9+
SHOW

PLEASANCE | PENTLAND ROOM

2PM | 1 HOUR | £6 OR £5 EACH FOR 3 OR MORE TICKETS

Join bestselling author **Mary Contini** and food writer **Pru Irvine** for a fun-filled hour of food chat, blind tastings and cookery tips for budding chefs. From Cheesy Easy Peasy Pasta to Scrumptious Slappleberry, Mary and Pru's new book challenges families to cook together, eat together and get real about good food.

Presented by Birlinn

THE BIG LAUNCH



AGES 7+
SHOW

PLEASANCE | QUAKER STUDIO

2PM | 1 HOUR | £6 OR £5 EACH FOR 3 OR MORE TICKETS

Become a Junior Editor and help us track down the most epic science stories. Catch the excitement in this fast-paced, fun presentation, as editors **Dan Green** and **Stevie Derrick** take you through the process of selecting stories for a magazine. Along the way, learn about the mysteries of animal sleep, the dangers of plastic pollution and engage in a live debate.

Presented by Dennis Publishing

ELECTRONIC MUSIC: INTERMEDIATE



AGES 11+
WORKSHOP

PLEASANCE | OCHIL ROOM

2PM | 90 MINS | £15

Find out how electronic circuits make noise and build one of your own. Using a soldering iron you'll construct a Junior Theremin, an early type of synthesiser that you play without touching. Previous soldering experience is required - an introductory workshop is available for soldering newbies at 11am. *Adults may accompany children for free but must buy a ticket if they wish to take part.*

Presented by MadLab Ltd



RECURRING EVENTS

P.12	10AM-4PM EASTER TRAIL ROYAL BOTANIC GARDEN EDINBURGH
P.12	10AM-4PM #LITTERCUBES DYNAMIC EARTH
P.12	10AM-4.30PM BIO-DISCOVERIES NATIONAL MUSEUM OF SCOTLAND
P.13	10AM-4.30PM MATHS: FRONTIERS OF IMAGINATION NATIONAL MUSEUM OF SCOTLAND
P.13	10AM-4.30PM POP-UP ENGINEERING NATIONAL MUSEUM OF SCOTLAND
P.12	10AM-5PM BUILD AND BREAK NATIONAL MUSEUM OF SCOTLAND
P.13	10AM-5PM CALORIE COUNTDOWN BIKE NATIONAL MUSEUM OF SCOTLAND
P.13	10AM-5PM STEMS, BEND YOUR BRAIN NATIONAL MUSEUM OF SCOTLAND
P.13	10AM-8PM MOMENTS IN TIME PLEASANCE
P.14	11AM AND 2PM PHYSICS WIZARDRY NATIONAL MUSEUM OF SCOTLAND
P.14	12PM AND 3PM GAME ON! NATIONAL MUSEUM OF SCOTLAND
P.8	24 HOURS A HUMAN TOUCH THE SCOTTISH PARLIAMENT

A FEW FEET UP

ALL AGES
WORKSHOP



PLEASANCE | OCHIL ROOM


11AM AND 2PM | 1 HOUR

£6 OR £5 EACH FOR 3 OR MORE TICKETS

Turn your world upside down! In this hands-on workshop you'll learn about lights, mirrors and how we can use them to see the world in a brand new way before making a periscope of your own to take home. You'll also get the chance to try out a large periscope and document just how different your distorted environment looks.

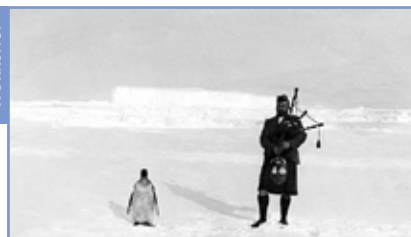
Presented by Same Difference Arts Ltd

RECURRING EVENTS

P.9-11		9.30AM-4.30PM CITY ART CENTRE During the Science Festival we transform City Art Centre's gallery spaces into a sensational science playground, packed full of workshops, shows and interactive events. Day pass required.	
P.12	10AM-4PM EASTER TRAIL ROYAL BOTANIC GARDEN EDINBURGH	P.13	10AM-5PM CALORIE COUNTDOWN BIKE NATIONAL MUSEUM OF SCOTLAND
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P.12	10AM-5PM BUILD AND BREAK NATIONAL MUSEUM OF SCOTLAND	P.8	24 HOURS A HUMAN TOUCH THE SCOTTISH PARLIAMENT

THE 1902 GREAT SCOTTISH ANTARCTIC EXPEDITION

AGES 6+
WORKSHOP



THE PATRICK GEDDES CENTRE

10.30AM | 90 MINS | ALSO ON WED 17 APRIL | **£11**

ACCOMPANYING ADULTS ARE FREE

In 1902 a team of young explorers set off from Riddle's Court in Edinburgh to map and better understand the Antarctic. Building their own ship, they docked over a rough winter, conducting numerous revolutionary experiments and set up the first Antarctic Met station. Join us in the very rooms in which they first met as we travel back in time to help address the challenges they faced along the way. *Children must be accompanied by an adult to help guide between challenges.*

Presented by The Patrick Geddes Centre

A MULTI-SENSORY POLAR ADVENTURE

ALL AGES
SHOW



PLEASANCE | PENTLAND ROOM

11AM AND 2PM | 45 MINS

£6 OR £5 EACH FOR 3 OR MORE TICKETS | **RP**

Come on a multi-sensory polar adventure with storyteller **Ailie Finlay** from Flotsam and Jetsam Puppets and Stories. We will go to the Antarctic, following in the footsteps of Captain Scott and his fellow explorers. This very interactive storytelling session features plenty of props and lots of joining in! *These relaxed performances are particularly suitable for children with additional needs and their friends and families.*

Presented by Flotsam and Jetsam Puppets and Stories

HOW TO BREAK THE INTERNET

AGES 12+
WORKSHOP



PLEASANCE | OCHIL ROOM

11AM | 2 HOURS | ON UNTIL WED 10 APRIL | **£12**

An investigation into the world of wireless internet, how it works and how you can break it. This workshop will show you how to build a jamming device to disrupt wireless networks, we will look at the physics of Faraday cages and then we'll move on to using professional-grade hacking software to spoof packets on a public wifi network. For ages 12-16 year olds with an interest in computing as this will be a step up from the cyber security taught in school.

APP FACTORY

AGES 12+
WORKSHOP



PLEASANCE | OCHIL ROOM

3PM | 2 HOURS | ON UNTIL WED 10 APRIL | **£12**

Come and create a new app for your Android phone. Discover the principles behind successful software development and put them into practice as you design, code and deploy a smartphone app. You'll be able to install your app on your phone and save the source code so you can keep on developing after the workshop. No previous experience is needed for this but an interest in coding is recommended.





CREATING AN OPEN FESTIVAL

Each event at the Science Festival is different. We have workshops, discussions, activities, exhibitions and more. In order to make our Festival more accessible, we are offering a range of services and events to make your visit more enjoyable.

SENSORY BACKPACKS

We have partnered with the Edinburgh Festival Fringe Society to offer sensory backpacks. These can be collected from the National Museum of Scotland, Pleasance and City Art Centre using a form of photo ID and a phone number or email. *Visit our website's access page for more information.*

RELAXED PERFORMANCES AND EARLY DOORS

There will be four relaxed performances during the Science Festival this year. *Melody and Sam: Record Breakers* (p.21) is a spectacular new show about perseverance and record-breaking success, *Ugly Animals: Weird Life Underwater* (p. 24) is an exploratory journey into deep-ocean wildlife and there are two *Multi-Sensory Polar Adventures* (p.15) with puppets and stories galore!




To provide an accessible environment for families with autistic children and children with complex sensory profiles we are hosting two early doors sessions on Monday 15 and Tuesday 16 April at the National Museum of Scotland for *Build and Break* (p.26).

CHANGING PLACES MOBILOO AT PLEASANCE

On Monday 8 April and Saturday 13 April we will have a Changing Places Mobiloo at Pleasance. The Mobiloo is a mobile toilet with hoist and changing table. *Please bring your own sling if you wish to use the hoist.* www.mobiloo.org.uk.

ADDITIONAL SERVICES

If you would like to request any of the following services for a specific event, please email us before Friday 8 March at marketing@scifest.co.uk prior to booking. Depending on availability.

-  BSL
-  Live Captioning
-  Hearing Loop (for Pleasance: Quaker Studio, Lomond Room and Upper Hall)

TUESDAY 9 APRIL

RECURRING EVENTS

P.9-11		9.30AM-4.30PM CITY ART CENTRE During the Science Festival we transform City Art Centre's gallery spaces into a sensational science playground, packed full of workshops, shows and interactive events. Day pass required.	
P.12	10AM-4PM EASTER TRAIL ROYAL BOTANIC GARDEN EDINBURGH	P.13	10AM-5PM STEMS, BEND YOUR BRAIN NATIONAL MUSEUM OF SCOTLAND
P.12	10AM-4PM #LITTERCUBES DYNAMIC EARTH	P.13	10AM-8PM MOMENTS IN TIME PLEASANCE
P.12	10AM-4.30PM BIO-DISCOVERIES NATIONAL MUSEUM OF SCOTLAND	P.15	11AM HOW TO BREAK THE INTERNET PLEASANCE
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P.13	10AM-5PM CALORIE COUNTDOWN BIKE NATIONAL MUSEUM OF SCOTLAND	P.8	24 HOURS A HUMAN TOUCH THE SCOTTISH PARLIAMENT

POUNDS AND PENCE: THE SCIENCE IN YOUR POCKET



AGES 8+
WORKSHOP

MUSEUM ON THE MOUND

10AM-4PM (HOURLY EXCEPT 1PM) ON TUES-FRI
1PM-4PM ON SAT | 40 MINS | ON UNTIL SAT 20 APRIL
FREE BOOKING REQUIRED

Billions of coins and millions of notes circulate daily, but rarely receive the scrutiny they deserve. In two special workshops, magnifiers and money-checkers will play their part in revealing the secrets behind the cash we handle every day. Lloyds Banking Group's Museum on the Mound in Edinburgh and the Royal Mint Museum near Cardiff are teaming up to put money 'under the microscope'. *Visit the Science Festival website for individual workshop times and details.*

Presented by Museum on the Mound and the Royal Mint Museum

SCRAPBOOK: FIGHT OCEAN PLASTICS FROM THE SKIES



AGES 5+
ACTIVITY

DYNAMIC EARTH | STRATOSPHERE

10AM-4PM | DROP-IN | ALSO ON WED 10 APRIL
FREE WITH ADMISSION

Find out about the SCRAPbook project (Scotland's Coastal Rubbish using Aerial Photography). Meet pilots who are joining the fight against plastic pollution and help classify different amounts of litter. Discover how this will help target beach cleans and hear from the Marine Conservation Society as they share how this information is vital to their work.

Presented by Dynamic Earth

GADGET FACTORY



AGES 8+
WORKSHOP

PLEASANCE | HIGHLAND ROOM

10AM, 11.30AM, 1.30PM AND 3PM | 45 MINS
ALSO ON WED 10 APRIL | **£8**

Join us in the *Gadget Factory* to investigate how everyday gadgets work and build your very own. After grasping the basics of creating an electronic circuit, pick your electronic components and use your new skills to assemble a flashing LED badge. After learning the secrets of soldering there is no end to the gadgets that can be made!

THE ZOOM CLUB DIGITAL ARTS LAB



AGES 8+
ACTIVITY

SUMMERHALL | THE ZOOM CLUB

10.30AM | 5 HOURS | ALSO ON THU 11, TUE 16 AND THU 18 APRIL | **£45**

Get experimental as we deconstruct ideas through animation, graphic novel, special effects and other dynamic digital storytelling techniques. Developed and delivered by The Zoom Crew, this is a drop-off activity and participants must bring a packed lunch. For ages 8-12. *Visit the Science Festival website for individual workshop information.*

Presented by The Zoom Club

DR BUNHEAD'S PUPPET MISSION TO MARS

AGES 4+
SHOW



NATIONAL MUSEUM OF SCOTLAND

EARLY PEOPLE GALLERY, LEVEL -1

11AM, 12PM, 1.30PM, 2.30PM AND 3.30PM | 25 MINS

ALSO ON WED 10 APRIL | FREE

Hold on tight as we blast off for **Dr Bunhead's Rubbish Puppets'** biggest, bravest adventure. Will they survive six months inside a wobbly cardboard spaceship? Are there really Mars Bars on Mars? Come and find out!

Presented by The University of Edinburgh

DIET: DESIGN AND DIVERSIFY

ALL AGES
ACTIVITY



ROYAL BOTANIC GARDEN EDINBURGH

JOHN HOPE GATEWAY

12PM-4PM | DROP-IN | FREE

Join scientists from nutrition and health research centre the Rowett Institute and statistical research organisation BioSS as they help you understand healthy diets and give you the opportunity to design your own healthy menu. Use the *Number Muncher Diets* calculator to work out what a healthy diet looks like and take part in hands-on activities to learn about food and health.

Presented by the Rowett Institute and BioSS

AMAZING IMMUNOLOGY

AGES 7+
WORKSHOP



NATIONAL MUSEUM OF SCOTLAND

LEARNING CENTRE LEVEL 4, STUDIO 1

12.30PM | 1 HOUR | ON UNTIL FRI 12 APRIL | £5

Get active and crafty with Denny and the T-Team and enjoy games that explain how your body's immune cells protect you from disease and keep you healthy. Play the ball pool challenge to discover how future treatments for cancers might work and make your own science sticker stories to take home. For ages 7-13. *Each ticket also admits one adult if required.*

Presented by The University of Edinburgh

EXPERIMENTARIUM

PLEASANCE | UPPER HALL

11AM-4PM | DROP-IN | ALSO ON WED 10 APRIL | FREE

The *Experimentarium* returns for Science Festival 2019, with some weird, wonderful and cutting-edge science. Step into our laboratory of hands-on activities and interactive fun for all ages.



9-10 APRIL

ADMIT ONE

AA1234567

TECHNOLOGY FOR DOGS WITH IMPORTANT JOBS

ALL AGES
ACTIVITY



Join The Open University, mobility assistance dogs from Charity Dogs for Good, and bio-detection dogs from Charity Medical Detection Dogs for a demonstration of cool canine-friendly technologies! Learn the challenges faced by our furry friends in the working world as you take on their role yourself before watching the professionals at work.

Presented by The Open University

HEALTHCARE FRONTIERS: SCIENCE IN THE NHS

ALL AGES
ACTIVITY



Meet healthcare scientists working within the NHS and experience a variety of new and exciting healthcare techniques. Get hands-on with some 3D printed organs, watch how they are made and learn how these organs are used to treat patients. Play a card game to learn about cellular therapies, and connect on social media with a fun photo frame accessory.

Presented by NHS National Services Scotland

HELPING SCOTLAND GROW

ALL AGES
ACTIVITY



Come and see how Scottish Government scientists are helping farmers. Try your hand at extracting strawberry DNA, identify potatoes using CSI (clever spud identifier) technology and get to see inside a beehive with the team from SASA.

Presented by SASA

THE MOON UNDER THE MICROSCOPE

ALL AGES
ACTIVITY



See a meteorite of lunar origin, official outreach samples of lunar rock and online high-resolution microscopy using both a virtual microscope and a remote-access microscope with The Open University. The *See for Yourself OpenSTEM Labs* exhibit features real and online interaction with material from the lunar surface. Images will be displayed on a large screen rather than viewed through an eyepiece.

Presented by The Open University

ALYX: THE SOCIAL ROBOT

ALL AGES
ACTIVITY



Learn about modern robot capabilities from a technical perspective and hear about the work conducted at Heriot-Watt University in this interactive activity. See a robot's ability to estimate a person's emotion from their face and body posture, as well as its ability to generate different facial expressions, gesture, talk and self-balance. Discover more about the work being done towards further advancements and the possible applications of such technology. *Also on Tuesday 16 and Wednesday 17 April in the National Museum of Scotland.*

Presented by Heriot-Watt University

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P.16	10AM, 11.30AM, 1.30PM & 3PM GADGET FACTORY PLEASANCE	P.13	10AM-4.30PM MATHS: FRONTIERS OF IMAGINATION NATIONAL MUSEUM OF SCOTLAND	P.17	11AM-3.30PM DR BUNHEAD NATIONAL MUSEUM OF SCOTLAND
P.12	10AM-4PM EASTER TRAIL ROYAL BOTANIC GARDEN EDINBURGH	P.13	10AM-4.30PM POP-UP ENGINEERING NATIONAL MUSEUM OF SCOTLAND	P.15	11AM HOW TO BREAK THE INTERNET PLEASANCE
P.12	10AM-4PM #LITTERCUBES DYNAMIC EARTH	P.12	10AM-5PM BUILD AND BREAK NATIONAL MUSEUM OF SCOTLAND	P.14	12PM AND 3PM GAME ON! NATIONAL MUSEUM OF SCOTLAND
P.16	10AM-4PM SCRAPBOOK: FIGHT OCEAN PLASTICS FROM THE SKIES DYNAMIC EARTH	P.12	10AM-5PM CALORIE COUNTDOWN BIKE NATIONAL MUSEUM OF SCOTLAND	P.17	12PM AMAZING IMMUNOLOGY NATIONAL MUSEUM OF SCOTLAND
P.16	10AM-4PM POUNDS AND PENCE MUSEUM ON THE MOUND	P.13	10AM-5PM STEMS, BEND YOUR BRAIN NATIONAL MUSEUM OF SCOTLAND	P.15	3PM APP FACTORY PLEASANCE
P.12	10AM-4.30PM BIO-DISCOVERIES NATIONAL MUSEUM OF SCOTLAND	P.13	10AM-5PM EXPERIMENTARIUM PLEASANCE	P.8	24 HOURS A HUMAN TOUCH THE SCOTTISH PARLIAMENT

FAMILY EVENTS

BOOKING HOTLINE: 0131 226 0005

ONLINE BOOKING: SCIENCEFESTIVAL.CO.UK

#LITTERCUBES WEIGH-IN



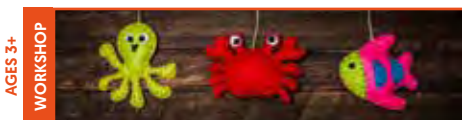
AGES 8+
ACTIVITY

DYNAMIC EARTH | EARTHSCAPE/STRATOSPHERE
10AM-4PM | DROP-IN | **FREE** WITH ADMISSION

Over the past few days, **Julia Barton** has constructed #LitterCUBES from litter she has collected on local beaches. Now Julia will weigh them and calculate the energy contained in each one in an interactive theatrical art piece. How much oil do the CUBES represent? How many fish suppers? Study the CUBES and join us in asking: how did it get onto our beaches and how can we stop it from getting there?

Presented by Dynamic Earth

CASSIUS THE CRAB



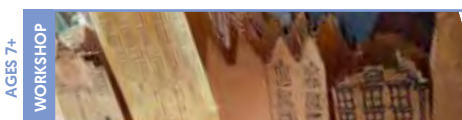
AGES 3+
WORKSHOP

PLEASANCE | PENTLAND ROOM
10.30AM AND 12PM | 1 HOUR | ALSO ON THURS 11 APRIL
£6 OR £5 EACH FOR 3 OR MORE TICKETS

Young ones will enjoy this fun, educational and interactive session sharing animal biology and conservation facts about our rockpool friends. Expect interactive props, imaginative play, music and song as we explore the amazing lives of crabs.

Presented by Wild Planet Explorers

TENEMENT TOWN



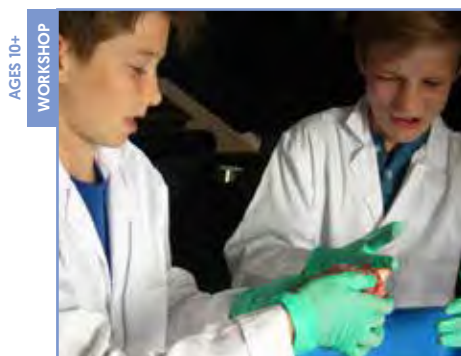
AGES 7+
WORKSHOP

PATRICK GEDDES CENTRE
10.30AM | 90 MINS | ALSO ON MON 15 AND TUE 16 APRIL
£10 ACCOMPANYING ADULTS ARE FREE

The tenements of Edinburgh's Old Town emerged through revolutionary engineering and architectural solutions to the unique geographical and urban challenges of the growing city. Survey these amazing structures and build your own tenement model to join our tenement town. *Children must be accompanied by an adult to help with the build.*

Presented by The Patrick Geddes Centre

LET'S LOOK AT LUNGS



AGES 10+
WORKSHOP

SURGEONS HALL MUSEUMS
11AM AND 1PM | 1 HOUR | ALSO ON WED 17 APRIL | **£7**
Ever wondered what the inside of your lungs look like? How does air travel through them and where does mucus come from? Answer all these questions and more when you dissect a pig's lung.

Presented by Surgeons Hall Museums

DISEASE DETECTIVES



ALL AGES
ACTIVITY

ROYAL BOTANIC GARDEN EDINBURGH
JOHN HOPE GATEWAY
12PM-4PM | DROP-IN | **FREE**
With an increasing number of viruses, bacteria and parasites that cause diseases in both animals and people, it is really important to be able to get a quick diagnosis. This family friendly hands-on activity allows you to be a Disease Detective and to try out some of the different tests that are used in labs to help find out which bugs are making us, and our animals, unwell.

Presented by Moredun Research Institute

ANIMATION LAB @ THE ZOOM CLUB



AGES 6+
ACTIVITY

SUMMERHALL | THE ZOOM CLUB
1.30PM | 2 HOURS | ALSO ON FRI 12, WED 17 AND FRI 19 APRIL | **£16**

Calling all animation adventurers! Pack your wackiest ideas and delve into your imagination in the awesome Animation Lab! Become a part-time palaeontologist during our *Dino Dig*; a magician of optical illusions through *Magic and Light*, a master of machines in *Human Cyborgs* or head off to explore *The Red Planet*. For ages 6-8.

Presented by the Zoom Club

STRONGWOMEN SCIENCE



AGES 5+
SHOW

PLEASANCE | PLEASANCE THEATRE
2PM | 30 MINS FOLLOWED BY 30 MINS ACTIVITY
£6 OR £5 EACH FOR 3 OR MORE TICKETS

StrongWomen circus scientists **Aoife** and **Maria** reveal the scientific secrets behind their astounding tricks. In a fun, lively and fast-paced performance, find out how jugglers, fire eaters, acrobats and hula hoop artists use science to create their amazing acts. Then have a go at some of the circus science experiments yourself in hands-on post-show activities (limited availability).

Presented by Circus250

BEYOND THE FESTIVAL



COMMUNITY

Making science accessible is at the heart of Edinburgh Science. To further audience engagement and break down barriers to make our annual Festival and other activities more accessible we are creating partnerships with community groups around Edinburgh and working with them to spread science engagement.

In our first year of community engagement we formed partnerships with 18 organisations for complimentary Festival tickets and worked with many groups outwith the Festival to bring science workshops, shows and discussions to their centres. We are also creating a sustainable platform with these partnerships by training youth workers to deliver science workshops and activities across their own programmes.

Community matters to Edinburgh Airport which is why they are the Science Festival's headline sponsor for community engagement activities in 2019. Edinburgh Airport aims to address issues of local concern and through their engagement team they help to provide a voice for the community and offer a range of opportunities to meet the public face-to-face, across a range of community initiatives. Edinburgh Airport focus on educating the community about their business and operations by hosting work experience placements, running tours and working alongside local charities and businesses. They carry out corporate fundraising activities and have a dedicated Charity Board which distributes funding to support local initiatives focused on health and well-being, environmental, educational or community based projects.

Edinburgh Airport
Where Scotland meets the world

cruden

UK Research
and Innovation

A PLACE FOR SCIENCE

With help from the PLACE (Platforms for Creative Excellence) programme the next three years will see us bring amazing science to more people, in more places, at more times.

As part of this unique three-way partnership between the Scottish Government, the City of Edinburgh Council and the Edinburgh Festivals, in collaboration with a range of partners, we will:

Innovate our programming to devise and tour world-class exhibitions and events.

Build upon and expand our community engagement and outreach activities year round, taking workshops and shows to community partners to help embed science in their programmes.

Provide training and skills development opportunities for our staff, partners and peers. This includes the launch of a delegate programme at the 2019 Science Festival.

Creating a PLACE for science, we will encourage excellence in science communication and bring incredible, educational science to wider audiences.

The Programme is funded by the Scottish Government, the City of Edinburgh Council, and the Edinburgh Festivals, and supported and administered by Creative Scotland.



Scottish Government
Riaghaltas na h-Alba
gov.scot

◆ EDINBURGH ◆
THE CITY OF EDINBURGH COUNCIL



ALBA | CHRUTHACHAIL

SCHOOLS AT THE SCIENCE FESTIVAL

Our science playground, covering five floors of activities galore in City Art Centre, opens up two days early this year to enable school groups across Edinburgh to access this family space!

By invitation only, up to 480 pupils will attend supported by our Headline *Schools at the Science Festival* Sponsor, Baillie Gifford along with Edina Trust. The Ogden Trust and Institute of Physics are also supporting this new opportunity, to specifically engage young people with physics through workshops *Little Sparks* and *Robo Constructors*.

The pupils attending will experience workshops and shows on Wednesday 3 and Thursday 4 April 2019 and will join an out-of-this-world adventure in *Mars Master Constructors*, test their goopiest slime on our *Splat-o-Meter* in *Splat-tastic* and be the first to explore our six new and refreshed workshops.

Introducing Catalysts

Find out more about how you or your organisation can support our work *Beyond the Festival* on p.25 and p.37.



Investment managers

Edina
Trust



making physics matter

IOP | Institute of Physics
In Scotland

RECURRING EVENTS

P.9-11

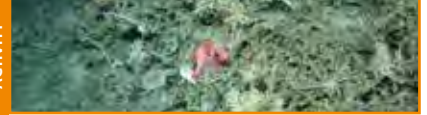


P.12

10AM-4PM | EASTER TRAIL
ROYAL BOTANIC GARDEN EDINBURGH

ATLANTIC ADVENTURES WITH ATLAS

AGES 5+
ACTIVITY



DYNAMIC EARTH | STRATOSPHERE

10AM-4PM | DROP-IN | ALSO ON SUN 14, MON 15, SAT 20 AND SUN 21 APRIL | **FREE** WITH ADMISSION

Do you know what lives in the deep waters around Scotland and the North Atlantic? Discover more about how scientists in the ATLAS project are exploring the deep sea and working out how to protect it in a changing ocean. Play with some real and virtual underwater robots, get hands-on with watery experiments and investigate biodiversity in the deep.

Presented by Dynamic Earth

COMPUTER-POWERED CHEMISTRY

ALL AGES
ACTIVITY



NATIONAL MUSEUM OF SCOTLAND

LEARNING CENTRE LEVEL 2

10AM-4.30PM | DROP-IN | ON UNTIL MON 15 APRIL | **FREE**

To help shape the world as we know it - from penicillin to fuel, plastic to dynamite - chemists use their imaginations to find hidden patterns in nature. Discover how logic, computers and imagination are combined to solve the complicated puzzles of chemistry.

Presented by The University of Edinburgh

THE ROBOTARIUM

ALL AGES
ACTIVITY



NATIONAL MUSEUM OF SCOTLAND

LEARNING CENTRE LEVEL 2

10AM-4.30PM | DROP-IN | ON UNTIL MON 15 APRIL | **FREE**

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 bots, learn how robots understand and imitate human beings and the important reasons why.

Presented by The University of Edinburgh

We're big believers in taking science out of the laboratory and into exciting new spaces. *Science in the Spotlight* aims to bring together the wonder of theatre and the explosive world of science communication.

Combining the best of science and theatre, *Science in the Spotlight* returns with an exciting show recommended for ages 5-8, *Melody and Sam: Record Breakers* (p.21). The show follows the journey of ambitious friends desperate to break a world record as they swim through challenges, over waves and underwater. *Melody and Sam: Record Breakers* is a story of determination that will inspire all ages.

Families looking for a day at the theatre will also enjoy a range of shows we have on offer at various venues across Edinburgh. Fix the future in the virtual reality world of *The Space in FutureQuest* (p.14), experience a multi-sensory polar adventure (p.15), come face to face to the science of circus with *StrongWomen Science* (p.18), or be shocked by the tales of *Dr Megaphone goes Zap* (p.22).

There is plenty to explore at the Science Festival this year for families to enjoy and even a *Science in the Spotlight* event just for grown-ups - *Science Theatre Scratch Night* - a night of work in progress short performances, poetry readings and comedy (p.44).

SCIENCE IN THE SPOTLIGHT

Developed with support from Creative Scotland through the Scottish Government's Festivals Expo Fund



Scottish Government
Riaghatais na h-Alba
gov.scot

9.30AM–4.30PM | **CITY ART CENTRE**
During the Science Festival we transform City Art Centre's gallery spaces into a sensational science playground, packed full of workshops, shows and interactive events. Day pass required.

P.16 10AM–4PM | **POUNDS AND PENCE**
MUSEUM ON THE MOUND

P.12 10AM–5PM | **BUILD AND BREAK**
NATIONAL MUSEUM OF SCOTLAND

P.13 10AM–5PM | **STEMS, BEND YOUR BRAIN**
NATIONAL MUSEUM OF SCOTLAND

P.13 10AM–8PM | **MOMENTS IN TIME**
PLEASANCE

P.16 10.30AM | **THE ZOOM CLUB DIGITAL ARTS LAB**
SUMMERHALL

P.18 10.30AM & 12PM | **CASSIUS THE CRAB**
PLEASANCE

P.17 12.30PM | **AMAZING IMMUNOLOGY**
NATIONAL MUSEUM OF SCOTLAND

P.8 24 HOURS | **A HUMAN TOUCH**
THE SCOTTISH PARLIAMENT

AIR POLLUTION: OUR SILENT PROBLEM

ALL AGES
ACTIVITY



NATIONAL MUSEUM OF SCOTLAND

HAWTHORNDEN COURT

10AM–5PM | DROP-IN | ON UNTIL MON 15 APRIL | **FREE**

Join British Heart Foundation Scotland for interactive activities and find out more about the silent problem of air pollution. Walk along Air Street to discover how air pollution affects your body and circulatory system, view real heart cells and discover how gold particles are being used in modern research.

Supported by



AGES 5+
SHOW



PLEASANCE | QUAKER STUDIO

11AM AND 1.30PM | 1 HOUR | ON UNTIL SAT 13 APRIL

£6 OR £5 EACH FOR 3 OR MORE TICKETS | **RP**

Sam and Melody want to break a world record. They train every day. They want to be the best, the fastest, the strongest, the largest, the longest – anything so long as they get their names in the big record book. Their official record attempt is just around the corner, when a message brings news that will possibly break up the team forever and take them on a journey across the seas, through the waves and into the deep. A hilarious and tender story of friendship and record-breaking success.

Please note the 1.30pm showing on Sat 13 April will be a relaxed performance.

Presented by Edinburgh Science Festival, working in partnership with Scottish Theatre Producers and Imaginee

Devised by Caitlin Skinner, Alice Mary Cooper, Ben Winger and Edinburgh Science Festival

Director and Dramaturg: Caitlin Skinner

Designer: Mamoru Iriguchi

Sound Designer: Danny Krass

Lighting Designer: Andrew Gannon

Developed with support from Creative Scotland through the Scottish Government's Festivals Expo Fund



Scottish Government
Riaghaltas na h-Alba
gov.scot

THE CHEMISTRY SHOW

AGES 6+
SHOW



NATIONAL MUSEUM OF SCOTLAND | AUDITORIUM

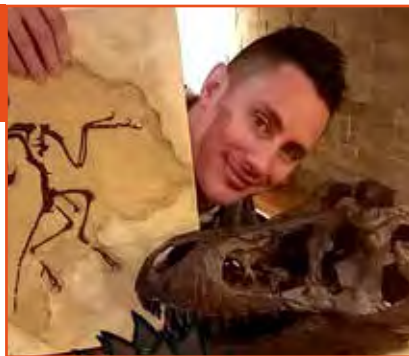
11AM | 1 HOUR | ALSO ON FRI 12 APRIL

£5 OR £4 EACH FOR 3 OR MORE TICKETS

Be prepared for bangs, colours, flames, foam and even a song! The vibrant show all about chemistry is back, jam-packed with mostly-educational experiments perfect for quizzical kids who want to know it all.

Presented by The University of Edinburgh

AGES 5+
SHOW



PLEASANCE | PLEASANCE THEATRE

2PM | 1 HOUR | **£6 OR £5 EACH FOR 3 OR MORE TICKETS**

Zoologist, presenter and author **Jules Howard** explores the latest fossil finds in this lively palaeo-packed show. Expect toilet roll timelines, how-to-fossilise-me guidance and free fossil gifts (plus, of course, fossil poo) as Jules delves into what makes this science such an exciting study area.

AGES 9+
WORKSHOP



PLEASANCE | OCHIL ROOM

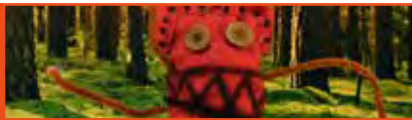
2PM | 1 HOUR 45 MINS | ALSO ON FRI 12 APRIL | **£15**

What lurks on the dark ocean floor? Investigate how creatures have adapted to these murky depths and make your very own soft light-up deep-sea monster. Using sewable switches and electrical components, make your creature gleam and glow on the dimly-lit seafloor before capturing its luminous glory in our custom Monster Photo Booth!

Presented by Howling Mouse Workshop

MAKE A MONSTER

AGES 7+
WORKSHOP



PLEASANCE | OCHIL ROOM

11AM | 90 MINS | ALSO ON FRI 12 APRIL | **£15**

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. Then capture a photograph of your monster in its natural habitat using our custom Monster Photo Booth!

Presented by Howling Mouse Workshop

RECURRING EVENTS

P.9-11		9.30AM-4.30PM CITY ART CENTRE During the Science Festival we transform City Art Centre's gallery spaces into a sensational science playground, packed full of workshops, shows and interactive events. Day pass required.	P.21	11AM THE CHEMISTRY SHOW NATIONAL MUSEUM OF SCOTLAND	
P.12	10AM-4PM EASTER TRAIL ROYAL BOTANIC GARDEN EDINBURGH	P.12	10AM-5PM BUILD AND BREAK NATIONAL MUSEUM OF SCOTLAND	P.21	11AM MAKE A MONSTER PLEASANCE
P.16	10AM-4PM POUNDS AND PENCE MUSEUM ON THE MOUND	P.21	10AM-5PM AIR-POLLUTION: OUR SILENT PROBLEM NATIONAL MUSEUM OF SCOTLAND	P.21	11AM & 1.30PM MELODY AND SAM: RECORD BREAKERS PLEASANCE
P.20	10AM-4.30PM COMPUTER-POWERED CHEMISTRY NATIONAL MUSEUM OF SCOTLAND	P.13	10AM-5PM STEMS, BEND YOUR BRAIN NATIONAL MUSEUM OF SCOTLAND	P.17	12.30PM AMAZING IMMUNOLOGY NATIONAL MUSEUM OF SCOTLAND
P.20	10AM-4.30PM THE ROBOTARIUM NATIONAL MUSEUM OF SCOTLAND	P.13	10AM-8PM MOMENTS IN TIME PLEASANCE	P.18	1.30PM ANIMATION LAB @ THE ZOOM CLUB SUMMERHALL
				P.21	2PM LIGHT UP MONSTERS OF THE DEEP DEEP SEA PLEASANCE
				P.8	24 HOURS A HUMAN TOUCH THE SCOTTISH PARLIAMENT

FAMILY EVENTS

CALL OF NATURE



AGES 5+ SHOW

ROYAL BOTANIC GARDEN EDINBURGH
JOHN HOPE GATEWAY
10.30AM, 12.30PM AND 2.30PM | 1 HOUR | **£6/£5**
The Institute of Eggsperts needs you and it might get muddy! Join our playful field trip and expert fools to explore the local landscape in search of a rare egg, finding laughter and wonder in the most unexpected places. A playful performance that puts young explorers in the driving seat using character clowning, improvisation, puppetry and adventure.
Presented by Tenterhooks

SHORE: HOW WE SEE THE SEA EXHIBITION



ALL AGES EXHIBITION

DYNAMIC EARTH | STRATOSPHERE
11AM-3PM | **DROP-IN** | ALSO ON SAT 13 APRIL
FREE WITH ADMISSION
Shore: How We See The Sea is a touring exhibition of new work from Scotland-based filmmakers **Margaret Salmon** and **Ed Webb-Ingall** that aims to inspire, explore and share coastal communities' responses to Marine Protected Areas. *The Shore* tour culminates at Dynamic Earth. For these two days you can meet those involved in the project and get their perspective. This exhibition of voices, creative responses and images gathered in participating communities will be on display Tues 9-Sun 21 April. Curated by Invisible Dust and supported by Creative Scotland and the Wellcome Trust.
Presented by Dynamic Earth

FRANKENSTEIN'S PLANTS



ALL AGES ACTIVITY

ROYAL BOTANIC GARDEN EDINBURGH
JOHN HOPE GATEWAY
12PM-4PM | **DROP-IN** | ON UNTIL SUN 14 APRIL | **FREE**
Join the Royal Botanic Garden Edinburgh science team, create a completely unique specimen from the pressed plants provided and upload it to a digital herbarium. You'll discover why plant specimens and digital images are so important for research and how scientists use the estimated three million plant specimens in the collection.
Presented by Royal Botanic Garden Edinburgh

BOOKING HOTLINE: 0131 226 0005

DR MEGAPHONE GOES ZAP!



AGES 8+ SHOW

PLEASANCE | PLEASANCE THEATRE
11AM AND 2PM | 1 HOUR | **£8.50/£6.50**
Be captivated by hilarious tales about the shocking and attractive histories of electricity and magnetism with stand-up engineer **Dr Ian 'Megaphone' Johnston**, singer-songwriter **Alan McClure** and long suffering demonstrator **Sandy the Science Boy**. Hear of the discoveries and inventions which created the modern age and the characters - passionate, eccentric and sometimes downright bizarre - who made them. Groan at the jokes, join in the choruses and gawk at the experiments.
Presented by The Open University

DISCOVER AMBER!



AGES 5+ WORKSHOP

PLEASANCE | UPPER HALL
11AM AND 2PM | 45 MINS
£6 OR £5 EACH FOR 3 OR MORE TICKETS
Join the search for prehistoric Madagascan insects and spiders! Searching through thousands of pieces of Madagascan copal amber, you'll discover a host of creatures that lived during the Stone Age - you can even take some of your finds away with you! Lively zoologist and author **Jules Howard** will be on hand to help identify discoveries using a special microscope.

THE VOLCANOES THAT ROCKED EDINBURGH




AGES 7+ ACTIVITY

DYNAMIC EARTH | HOLYROOD PARK
2PM | 2 HOURS | ALSO ON SUN 14 APRIL | **£8/£5**
Explore the volcanic eruptions that rocked Edinburgh and helped shape the landscape we see today. Be guided through the undulating past of Holyrood Park through the eyes of expert geologist **Angus Miller**. Hear stories of these different volcanoes, comparing them to modern eruptions to help us understand what happened in Edinburgh in the past and then head out into Holyrood Park to track down the evidence. *Please dress appropriately for this outdoor event including sensible footwear and waterproof clothing.*
Presented by Dynamic Earth

ONLINE BOOKING: SCIENCEFESTIVAL.CO.UK

RECURRING EVENTS

P.9-11		9.30AM-4.30PM CITY ART CENTRE During the Science Festival we transform City Art Centre's gallery spaces into a sensational science playground, packed full of workshops, shows and interactive events. Day pass required.	P.21	11AM & 1.30PM MELODY AND SAM: RECORD BREAKERS PLEASANCE	
P.12	10AM-4PM EASTER TRAIL ROYAL BOTANIC GARDEN EDINBURGH	P.12	10AM-5PM BUILD AND BREAK NATIONAL MUSEUM OF SCOTLAND	P.22	11AM-3PM SHORE: HOW WE SEE THE SEA DYNAMIC EARTH
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P.20	10AM-4.30PM THE ROBOTARIUM NATIONAL MUSEUM OF SCOTLAND	P.13	10AM-8PM MOMENTS IN TIME PLEASANCE	P.16	10AM-4PM POUNDS AND PENCE MUSEUM ON THE MOUND
				P.22	2PM THE VOLCANOES THAT ROCKED EDINBURGH DYNAMIC EARTH
				P.8	24 HOURS A HUMAN TOUCH THE SCOTTISH PARLIAMENT

INTERACTIVE FAMILY DAY



ALL AGES
SPECIAL EVENT

THE SCOTTISH PARLIAMENT

10AM-4PM | DROP-IN | ALSO ON SAT 6 APRIL | FREE

Join us on an unrivalled adventure in science. Journey through space and discover the marvels of modern science through hands-on activities. Tour the Universe and explore the wonder of the night sky in an inflatable planetarium and enjoy interactive exhibits - from controlling lightning to seeing through a hole in your hand! You can also meet an astronomer, hold a meteorite, learn more about how Earth and space interact and lots more. Visit parliament.scot/science for more information.

Presented by The Scottish Parliament

INSIDE A NUCLEAR REACTOR



ALL AGES
ACTIVITY

NATIONAL MUSEUM OF SCOTLAND

HAWTHORNDEN COURT

10AM-5PM | DROP-IN | ON UNTIL SUN 21 APRIL | FREE

Come to the planetarium where you can shrink to the size of an atom, journey with EDF Energy to the core of a nuclear reactor and travel where no one has gone before. Watch how nuclear fission happens inside our power stations and how the energy is used as steam to turn turbines producing electricity for your home.

Supported by



HERIOT-WATT FAMILY DAY



ALL AGES
SPECIAL EVENT

ORIAM

10AM-4PM | DROP-IN | FREE

Discover the wonders of science and sport, and get hands-on with cutting edge research, spanning robots and virtual reality to bacteria and body parts. As part of Heriot-Watt's Year of Health, Oriam, Scotland's National Performance Centre for Sport, transforms into a marathon of discovery. The day will be packed with workshops and interactive activities, exploring healthy homes, bodies and minds.

Supported by



WILD DAY OUT



ALL AGES
ACTIVITY

HOLYROOD PARK | EDUCATION CENTRE

10AM-4PM | DROP-IN | FREE

Wild adventures await you at Holyrood Park! Explore dramatic landscapes and discover more about the birds and wildlife living in Edinburgh. With face painting, a nature science lab and lots of wildlife themed activities, don't miss the opportunity to discover your wild side in the heart of the city! Please dress appropriately for this outdoor event including sensible footwear and waterproof clothing.

Presented by Historic Environment Scotland and RSPB Scotland

Image: Helen Pugh Photography

DIRECT ANIMATION WORKSHOP



AGES 7+
WORKSHOP

COLLECTIVE | CALTON HILL

10.30AM | 3 HOURS | £6/£4

Join us at Collective's new home on Calton Hill to investigate lenses; instruments that correct and expand the frontiers of vision. Artist and curator **Lydia Beilby** leads this hands-on workshop making abstract animations on celluloid film. Draw, paint, etch and collage directly onto film to create your own mesmerising moving image.

Presented by Collective



UGLY ANIMALS: WEIRD LIFE UNDERWATER

AGES 7+
SHOW



PLEASANCE | PLEASANCE THEATRE

11AM AND 2PM | 1 HOUR | £6 OR £5 EACH FOR 3 OR MORE TICKETS | RP

From fish that use sickening slime as defence to sea cucumbers that fight with their bum, our seas are full of some of the strangest animals in the world. Join biologist and presenter **Simon Watt** to hear how to help these creatures and our planet survive. *Please note the 11am showing will be a relaxed performance.*

MEET EDISON: OUR PROGRAMMABLE BOT

AGES 8+
WORKSHOP



PLEASANCE | HIGHLAND ROOM

11AM AND 2PM | 2 HOURS | £15

Meet Edison – our LEGO® compatible, programmable bot! Discover basic robotics as you begin by using barcodes to program Edison before moving on to more advanced processes. You can program Edison to move when clapping, communicate with light and music and navigate through a series of maps, obstacles and local landmarks.

Presented by ComputerXplorers

THE GREENROOM

ALL AGES
ACTIVITY



STILLS CENTRE FOR PHOTOGRAPHY

11AM–4PM | DROP-IN | ON UNTIL SUN 21 APRIL | FREE

Experiment with producing environmentally friendly, plant-based photographic prints. Using a variety of plants and natural ingredients, have a go at creating colourful compositions. The prints created will be exhibited in a one-off evening exhibition in partnership with **The Real Junk Food Project** on Fri 19 April from 5pm where admission is free (no booking required) and a pay-as-you-feel buffet will be available.

Presented by Stills Centre for Photography

UNCERTAIN FRONTIERS PHOTOGRAPHY WORKSHOP

AGES 14+
WORKSHOP



NATIONAL MUSEUM OF SCOTLAND

LEARNING CENTRE LEVEL 4, STUDIO 2

1PM | 3 HOURS | £5

Create a stunning photographic image using recycled material! Explore and create, through the use of recycled materials, a world view of topics that science does not always get right. International photographic artist **Ron O'Donnell** will inspire and energise you to create an alternative view of our world, highlighting issues such as plastic pollution and nuclear weapons.

Presented by Edinburgh Napier University

TRACKS AND SIGNS

AGES 12+
ACTIVITY



PLEASANCE | MEET IN OCHIL ROOM

2PM | 2 HOURS

£6 OR £5 EACH FOR 3 OR MORE TICKETS

In the spirit of exploration we are bringing wild bushcraft to urban Edinburgh. Join our tracking expert for a fascinating workshop discovering how you can make sense of the signs all around you. Explore the hidden world of elusive animals, learn how to use all your senses, and practice tracking in the city's green spaces. *Please dress appropriately for this outdoor event including sensible footwear and waterproof clothing.*

RECURRING EVENTS

P.12

10AM–4PM | EASTER TRAIL
ROYAL BOTANIC GARDEN EDINBURGH

P.20

10AM–4PM | ATLANTIC ADVENTURES WITH ATLAS
DYNAMIC EARTH

P.20

10AM–4.30PM | COMPUTER-POWERED CHEMISTRY
NATIONAL MUSEUM OF SCOTLAND

P.20

10AM–4.30PM | THE ROBOTARIUM
NATIONAL MUSEUM OF SCOTLAND

P.12

10AM–5PM | BUILD AND BREAK
NATIONAL MUSEUM OF SCOTLAND

ANALOGUE EXPLORERS WORKSHOP

AGES 7+
WORKSHOP



COLLECTIVE | CALTON HILL

10.30AM | 3 HOURS | £6/£5

Join us at Collective's new home on Calton Hill to investigate lenses; instruments that correct and expand the frontiers of vision. Artist and curator **Lydia Beilby** leads this hands-on workshop to discover the wonder of analogue film technology, explore the nature of 'seeing' and use found film to create your own imaginative stories.

Presented by Collective

LIGHT DRAWING

ALL AGES
WORKSHOP



PLEASANCE | QUAKER STUDIO

11AM | 1 HOUR | £10

Scientifically creative and creatively scientific, *Light Drawing* is an illuminating workshop on the science of light and photography led by science communicator **Dr Kathryn Harkup**. With a bit of help from science you can sketch and doodle with a light bulb. Using long exposure photography and a little imagination we will be making brilliant, bright and bold images.



SCIENCE CHANGES LIVES

P.23	10AM-5PM INSIDE A NUCLEAR REACTOR NATIONAL MUSEUM OF SCOTLAND
P.13	10AM-8PM MOMENTS IN TIME PLEASANCE
P.24	11AM-4PM THE GREENROOM STILLS CENTRE FOR PHOTOGRAPHY
P.22	12PM-4PM FRANKENSTEIN'S PLANTS ROYAL BOTANIC GARDEN EDINBURGH
P.22	2PM THE VOLCANOES THAT ROCKED EDINBURGH DYNAMIC EARTH
P.8	24 HOURS A HUMAN TOUCH THE SCOTTISH PARLIAMENT

GAME DESIGN USING XBOX CONTROLLERS



AGES 8+
WORKSHOP

PLEASANCE | HIGHLAND ROOM
11AM AND 2PM | 2 HOURS | £15

Time to take control of the game. Using an Xbox controller, learn how to create a range of terrains, worlds and characters, controlling movement, sound and vision using an intuitive icon-based programming language. At the end of the workshop you will have your very own video game to take home and play!

Presented by ComputerExplorers

SING AND DANCE IN SPACE AND TIME WITH MR BOOM



AGES 3+
SHOW

PLEASANCE | CABARET BAR
2PM | 1 HOUR | £6 OR £5 EACH FOR 3 OR MORE TICKETS

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.

CATALYSTS

Our *Catalysts* are a network of individuals, trusts and companies who encourage the next generation to engage with science, technology, engineering and mathematics.

By each making a financial gift, this group of *Catalysts* ensures that our activities can be enjoyed by all - wherever they are and whatever their background.

Thank you to our 2019 *Catalysts* for their generous support.

BENEFACTORS

The Edina Trust
Dr David Milne
The Nimar Charitable Trust

PATRONS

BESTTrust
Dr Simon Gage OBE
Dr Chris Masters
Mairi Mickel
Iain Ritchie CBE
SQA

INNOVATORS

Joe Faraday
Dr Richard Kimberlin
Kimberley & Leslie Munro
Prof Ian Wall
The W.M. Mann Foundation

ADVOCATES

Ms Edna Bird
Ron Inglis
Hazel Lambert

and all those who wish to remain anonymous

Science and technology are central to your life and they can change the world. What advancements or discoveries have you witnessed in your lifetime?

- Polio vaccine 1955
- Organ transplants 1960
- Moon landings 1969
- PCs 1977
- World Wide Web 1989
- Dolly the sheep 1996
- iPhone 2007
- Dark matter 2009
- Gravitational waves 2016

Could the next one be a cure for cancer? An answer to climate change or holidays on Mars?

Advancements in science and technology is dependent on inspiring young people of today to explore the world and help secure a successful and sustainable future.

Edinburgh Science is Scotland's largest science engagement charity and we cannot continue our work without support.

MAKE A DIFFERENCE

Please look out for our *Donation Stations* at Science Festival venues and help us to deliver our world-leading Science Festival; community activities; education workshops in schools across Scotland, reaching 60,000 children each year; and an inspiring careers event to show young people the breadth of options for their future.

For more information on donating as an individual or organisation, please contact Hannah hannah.schlesinger@scifest.co.uk

Registered Charity no. SC003790



RECURRING EVENTS

P.9-11	 9.30AM-4.30PM CITY ART CENTRE During the Science Festival we transform City Art Centre's gallery spaces into a sensational science playground, packed full of workshops, shows and interactive events. Day pass required.
P.12	10AM-4PM EASTER TRAIL ROYAL BOTANIC GARDEN EDINBURGH
P.20	10AM-4PM ATLANTIC ADVENTURES WITH ATLAS DYNAMIC EARTH
P.20	10AM-4.30PM COMPUTER-POWERED CHEMISTRY NATIONAL MUSEUM OF SCOTLAND
P.20	10AM-4.30PM THE ROBOTARIUM NATIONAL MUSEUM OF SCOTLAND
P.12	10AM-5PM BUILD AND BREAK NATIONAL MUSEUM OF SCOTLAND
P.23	10AM-5PM INSIDE A NUCLEAR REACTOR NATIONAL MUSEUM OF SCOTLAND
P.18	10.30AM TENEMENT TOWN THE PATRICK GEDDES CENTRE
P.24	11AM-4PM THE GREENROOM STILLS CENTRE FOR PHOTOGRAPHY
P.8	24 HOURS A HUMAN TOUCH THE SCOTTISH PARLIAMENT

EARLY DOORS: BUILD AND BREAK



NATIONAL MUSEUM OF SCOTLAND | GRAND GALLERY
9AM | 1 HOUR | ALSO ON TUES 16 APRIL

FREE BOOKING REQUIRED | **RP**

To provide an accessible environment for families with autistic children and children with complex sensory profiles we are hosting two early doors sessions at the National Museum of Scotland for *Build and Break* (p.12).

FURTHER, FASTER, HIGHER



NATIONAL MUSEUM OF FLIGHT

11AM-4PM | DROP-IN | ON UNTIL MON 22 APRIL

FREE WITH ADMISSION

From Concorde to the R.34 airship, discover the science behind the pioneering aircraft in the museum through a technical challenge, family trail and craft activities.

Presented by National Museum of Flight

RECURRING EVENTS

P.26	9AM EARLY DOORS: BUILD AND BREAK NATIONAL MUSEUM OF SCOTLAND
P.9-11	 9.30AM-4.30PM CITY ART CENTRE During the Science Festival we transform City Art Centre's gallery spaces into a sensational science playground, packed full of workshops, shows and interactive events. Day pass required.

DELVING INTO DEEP EARTH. EXPLORING OUR FINAL FRONTIER



DYNAMIC EARTH | STRATOSPHERE

10AM-4PM | DROP-IN | FREE WITH ADMISSION

The UK Geoenery Observatories project invites you to explore the fascinating secrets of the geological underworld and talk to experts from the British Geological Survey and Professor of Geoscience Communication, **Prof Iain Stewart**. The project is developing two unique Earth observatories to research energy solutions for a cleaner, greener future. Discover the uses of different types of rocks and minerals, how the Earth is constantly moving and even make your own earthquakes!

Presented by Dynamic Earth

BIG DATA DETECTIVES



NATIONAL MUSEUM OF SCOTLAND

LEARNING CENTRE LEVEL 2

10AM-4.30PM | DROP-IN | ON UNTIL THU 18 APRIL | FREE

Join our data scientists to find out how big data is being used in mental health research. Who is at risk of mental illness? What role do genetics and life events play? And could genetic testing help doctors to prescribe you the right drug? Then become our 'Dr Data' to manage the future of our research project in a brand-new computer game.

Presented by The University of Edinburgh

THE GIANT CELL



NATIONAL MUSEUM OF SCOTLAND

LEARNING CENTRE LEVEL 2

10AM-4.30PM | DROP-IN | ON UNTIL THU 18 APRIL | FREE

Explore hidden microscopic worlds found inside your cells and find out how scientists use fluorescent microscopy to reveal important clues to help us fight disease. Step inside a soft, squishy, ginormous cell and see what you can find using UV light.

Presented by The University of Edinburgh

P.12	10AM-4PM EASTER TRAIL ROYAL BOTANIC GARDEN EDINBURGH
P.16	10AM-4PM POUNDS AND PENCE MUSEUM ON THE MOUND
P.12	10AM-5PM BUILD AND BREAK NATIONAL MUSEUM OF SCOTLAND
P.23	10AM-5PM INSIDE A NUCLEAR REACTOR NATIONAL MUSEUM OF SCOTLAND
P.18	10.30AM TENEMENT TOWN THE PATRICK GEDDES CENTRE

SECRETS OF ANIMAL DNA



NATIONAL MUSEUM OF SCOTLAND

LEARNING CENTRE LEVEL 2

10AM-4.30PM | DROP-IN | ON UNTIL THU 18 APRIL | FREE

Scientists in Edinburgh have been studying the DNA of animals for 100 years. Find out how researchers at The Roslin Institute are exploring the genomes of all creatures great and small, to improve the health and welfare of animals and people.

Presented by The University of Edinburgh

HANDS-ON ROBOTS



NATIONAL MUSEUM OF SCOTLAND

HAWTHORNDEN COURT

10AM-5PM | DROP-IN | ON UNTIL THU 18 APRIL | FREE

Enjoy fun activities with mobile robots designed by students from Edinburgh Napier University. See how they work and what they can do and do some programming of your own. Parents welcome and encouraged to help.

ALYX: THE SOCIAL ROBOT



NATIONAL MUSEUM OF SCOTLAND

HAWTHORNDEN COURT

10AM-5PM | DROP-IN | ALSO ON WED 17 APRIL | FREE

Learn about modern robot capabilities from a technical perspective and hear about the work conducted at Heriot-Watt University in this interactive activity. See a robot's ability to estimate a person's emotion from their face and body posture, as well as its ability to generate different facial expressions, gesture, talk and self-balance. Discover more about the work being done towards further advancements and the possible applications of such technology. *Also on Tuesday 9 and Wednesday 10 April in Pleasance as part of Experimentarium.*

Presented by Heriot-Watt University

RECURRING EVENTS

P.16	10.30AM THE ZOOM CLUB DIGITAL ARTS LAB SUMMERHALL
P.26	11AM-4PM FURTHER, FASTER, HIGHER NATIONAL MUSEUM OF FLIGHT
P.24	11AM-4PM THE GREENROOM STILLS CENTRE FOR PHOTOGRAPHY
P.8	24 HOURS A HUMAN TOUCH THE SCOTTISH PARLIAMENT



P.9-11

9.30AM-4.30PM | **CITY ART CENTRE**
During the Science Festival we transform City Art Centre's gallery spaces into a sensational science playground, packed full of workshops, shows and interactive events. Day pass required.

P.12 10AM-4PM | EASTER TRAIL
ROYAL BOTANIC GARDEN EDINBURGH

P.23 10AM-5PM | INSIDE A NUCLEAR REACTOR
NATIONAL MUSEUM OF SCOTLAND

P.16 10AM-4PM | POUNDS AND PENCE
MUSEUM ON THE MOUND

P.15 10.30AM | THE 1902 GREAT SCOTTISH ANTARCTIC EXPEDITION | **THE PATRICK GEDDES CENTRE**

P.26 10AM-4.30PM | BIG DATA DETECTIVES
NATIONAL MUSEUM OF SCOTLAND

P.18 11AM & 1PM | LET'S LOOK AT LUNGS
SURGEONS' HALL MUSEUMS

P.26 10AM-4.30PM | THE GIANT CELL
NATIONAL MUSEUM OF SCOTLAND

P.27 11AM & 2PM | BUILD A COMPUTER
NATIONAL MUSEUM OF SCOTLAND

P.26 10AM-4.30PM | SECRETS OF ANIMAL DNA
NATIONAL MUSEUM OF SCOTLAND

P.26 11AM-4PM | FURTHER, FASTER, HIGHER
NATIONAL MUSEUM OF FLIGHT

P.12 10AM-5PM | BUILD AND BREAK
NATIONAL MUSEUM OF SCOTLAND

P.24 11AM-4PM | THE GREENROOM
STILLS CENTRE FOR PHOTOGRAPHY

P.26 10AM-5PM | HANDS-ON ROBOTS
NATIONAL MUSEUM OF SCOTLAND

P.18 1.30PM | ANIMATION LAB @ THE ZOOM CLUB
SUMMERHALL

P.26 10AM-5PM | ALYX: THE SOCIAL ROBOT
NATIONAL MUSEUM OF SCOTLAND

P.8 24 HOURS | A HUMAN TOUCH
THE SCOTTISH PARLIAMENT

IT'S MY TURN!

AGES 5+
SHOW



NATIONAL MUSEUM OF SCOTLAND | AUDITORIUM

11AM AND 2PM | 45 MINS

£6 OR £5 EACH FOR 3 OR MORE TICKETS

Ellie struggles to talk to her parents because she just can't get her timing right; either she interrupts them or they've moved on. With help from friendly musicians, an annoying older sibling and you, Ellie learns when it is her turn to talk and finally tells her parents about the fairy she discovered in the cupboard – but how will her family respond? For ages 5-8.

Presented by The University of Edinburgh

BUILD A COMPUTER

AGES 8+
WORKSHOP



NATIONAL MUSEUM OF SCOTLAND

LEARNING CENTRE LEVEL 4 SEMINAR ROOM

11AM AND 2PM | 1 HOUR | ON UNTIL SAT 20 APRIL | **£5**

Have you ever built a computer? Grab a screwdriver and have a go. Learn how the components fit together and see if you can start it up. For ages 8-12. *Each ticket also admits one adult who is required to participate.*

Presented by The University of Edinburgh

REVEALING SCOTLAND'S COLD-WATER CORAL REEF

AGES 8+
ACTIVITY



DYNAMIC EARTH | STRATOSPHERE

10AM-4PM | DROP-IN | ALSO ON FRI 19 APRIL

FREE WITH ADMISSION

Did you know that Scotland has its own coral reefs? Scientists from the University of Edinburgh will help you learn more about these amazing reefs with a selection of interactive, sensory activities. Touch real specimens and find out just what these reefs can do for us and why we should care about them. Bring along a clean glass jar to make a crafty coral creation to take away!

Presented by Dynamic Earth

100 THINGS TO KNOW ABOUT SPACE

AGES 9+
SHOW



NATIONAL MUSEUM OF SCOTLAND | AUDITORIUM

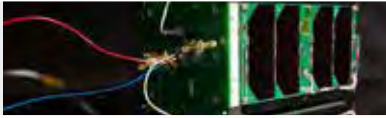
11AM | 1 HOUR | **£6 OR £5 EACH FOR 3 OR MORE TICKETS**

Join the **Usborne Fact Force** as they take you on a fascinating journey to outer space, followed by a big space quiz at the end. Did you know the snow on Mars is square? That there's a cloud in outer space that tastes like raspberries? Do you know how to escape a black hole? Or why astronauts learn wilderness survival skills? Come along to find out!

Presented by Usborne Publishing



RECURRING EVENTS

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P.12	10AM-4PM EASTER TRAIL ROYAL BOTANIC GARDEN EDINBURGH	P.23 10AM-5PM INSIDE A NUCLEAR REACTOR NATIONAL MUSEUM OF SCOTLAND
P.16	10AM-4PM POUNDS AND PENCE MUSEUM ON THE MOUND	P.16 10.30AM THE ZOOM CLUB DIGITAL ARTS LAB SUMMERHALL
P.26	10AM-4.30PM BIG DATA DETECTIVES NATIONAL MUSEUM OF SCOTLAND	P.27 11AM & 2PM BUILD A COMPUTER NATIONAL MUSEUM OF SCOTLAND
P.26	10AM-4.30PM THE GIANT CELL NATIONAL MUSEUM OF SCOTLAND	P.26 11AM-4PM FURTHER, FASTER, HIGHER NATIONAL MUSEUM OF FLIGHT
P.26	10AM-4.30PM SECRETS OF ANIMAL DNA NATIONAL MUSEUM OF SCOTLAND	P.24 11AM-4PM THE GREENROOM STILLS CENTRE FOR PHOTOGRAPHY
P.12	10AM-5PM BUILD AND BREAK NATIONAL MUSEUM OF SCOTLAND	P.8 24 HOURS A HUMAN TOUCH THE SCOTTISH PARLIAMENT
P.26	10AM-5PM HANDS-ON ROBOTS NATIONAL MUSEUM OF SCOTLAND	

FAMILY EVENTS

BOOKING HOTLINE: 0131 226 0005

VAL.CO.UK

WILDLIFE AND SOILS THAT CALL SCOTLAND HOME



ALL AGES
ACTIVITY

DYNAMIC EARTH | STRATOSPHERE

10AM-4PM | DROP-IN | **FREE** WITH ADMISSION

Ever thought about where your morning bowl of porridge comes from? Or which birds and wildlife make our farmland their home? With 75% of the UK's land used for agriculture, what happens on this land is vital for us and for wildlife. Come and meet scientists from the RSPB and James Hutton Institute to delve into the soils and wildlife of Scotland's farmland. Try your hand at birdcake making, potato sorting and soil sampling.

Presented by Dynamic Earth

ST KILDA'S SECRETS: A MINECRAFT ADVENTURE



ALL AGES
ACTIVITY

NATIONAL MUSEUM OF SCOTLAND

HAWTHORNDEN COURT

10AM-5PM | DROP-IN | **FREE**

Unlock St Kilda's secrets for the first time in Minecraft! On World Heritage Day, explore a digital reconstruction of one of Scotland's six World Heritage Sites and experience life on the extreme western frontier of Europe. From the Bronze Age to the 20th century, discover the hidden story of the prisoner of St Kilda and uncover the archaeology of the island's prehistoric roots.

Presented by The Society of Antiquaries Scotland

RECURRING EVENTS

P.9-11		9.30AM-4.30PM CITY ART CENTRE During the Science Festival we transform City Art Centre's gallery spaces into a sensational science playground, packed full of workshops, shows and interactive events.
P.12	10AM-4PM EASTER TRAIL ROYAL BOTANIC GARDEN EDINBURGH	P.27 10AM-4PM REVEALING SCOTLAND'S COLD-WATER CORAL REEF DYNAMIC EARTH
P.27	10AM-4PM REVEALING SCOTLAND'S COLD-WATER CORAL REEF DYNAMIC EARTH	P.16 10AM-4PM POUNDS AND PENCE MUSEUM ON THE MOUND
P.16	10AM-4PM POUNDS AND PENCE MUSEUM ON THE MOUND	P.12 10AM-5PM BUILD AND BREAK NATIONAL MUSEUM OF SCOTLAND
P.12	10AM-5PM BUILD AND BREAK NATIONAL MUSEUM OF SCOTLAND	P.23 10AM-5PM INSIDE A NUCLEAR REACTOR NATIONAL MUSEUM OF SCOTLAND
P.23	10AM-5PM INSIDE A NUCLEAR REACTOR NATIONAL MUSEUM OF SCOTLAND	P.27 11AM & 2PM BUILD A COMPUTER NATIONAL MUSEUM OF SCOTLAND
P.27	11AM & 2PM BUILD A COMPUTER NATIONAL MUSEUM OF SCOTLAND	P.26 11AM-4PM FURTHER, FASTER, HIGHER NATIONAL MUSEUM OF FLIGHT
P.26	11AM-4PM FURTHER, FASTER, HIGHER NATIONAL MUSEUM OF FLIGHT	P.24 11AM-4PM THE GREENROOM STILLS CENTRE FOR PHOTOGRAPHY
P.24	11AM-4PM THE GREENROOM STILLS CENTRE FOR PHOTOGRAPHY	P.18 1.30PM ANIMATION LAB @ THE ZOOM CLUB SUMMERHALL
P.18	1.30PM ANIMATION LAB @ THE ZOOM CLUB SUMMERHALL	P.8 24 HOURS A HUMAN TOUCH THE SCOTTISH PARLIAMENT
P.8	24 HOURS A HUMAN TOUCH THE SCOTTISH PARLIAMENT	

MEDICAL FRONTIERS: FROM SCIENCE TO FUTURE MEDICINE



ALL AGES
ACTIVITY

NATIONAL MUSEUM OF SCOTLAND

LEARNING CENTRE LEVEL 2

10AM-4.30PM | DROP-IN | **ALSO ON SAT 20 APRIL**

FREE

Join our biomedical research scientists to find out how science and new technologies are advancing the frontiers of future medicine. Explore inside your cells, heart and brain, learn how bodies function and discover the challenges of tackling disease in a technology led, data-driven world.

Presented by The University of Edinburgh

IVO KOHLER EXPERIENCE



ALL AGES
ACTIVITY

NATIONAL MUSEUM OF SCOTLAND

HAWTHORNDEN COURT

10AM-5PM | DROP-IN | **ON UNTIL SUN 21 APRIL** | **FREE**

Peer through the back of a large eye to see how an eyeball projects an image of the world onto your retina. Learn about the amazing Ivo Kohler and the Innsbruck upside down experiment before testing a pair of upside down goggles for yourself.



Discover **NATIONAL MUSEUM OF SCOTLAND**

AA1234567
FESTIVAL FRONTIERS
MUSEUM OUTPOST

SATURDAY 20 APRIL

RECURRING EVENTS



P.9-11

9.30AM-4.30PM | **CITY ART CENTRE**
During the Science Festival we transform City Art Centre's gallery spaces into a sensational science playground, packed full of workshops, shows and interactive events.

P.12

10AM-4PM | **EASTER TRAIL**
ROYAL BOTANIC GARDEN EDINBURGH

P.20

10AM-4PM | **ATLANTIC ADVENTURES WITH ATLAS**
DYNAMIC EARTH

P.16

10AM-4PM | **POUNDS AND PENCE**
MUSEUM ON THE MOUND

P.28

10AM-4.30PM | **MEDICAL FRONTIERS**
NATIONAL MUSEUM OF SCOTLAND

P.12

10AM-5PM | **BUILD AND BREAK**
NATIONAL MUSEUM OF SCOTLAND

P.23

10AM-5PM | **INSIDE A NUCLEAR REACTOR**
NATIONAL MUSEUM OF SCOTLAND

P.28

10AM-5PM | **IVO KOHLER EXPERIENCE**
NATIONAL MUSEUM OF SCOTLAND

P.27

11AM & 2PM | **BUILD A COMPUTER**
NATIONAL MUSEUM OF SCOTLAND

P.24

11AM-4PM | **THE GREENROOM**
STILLS CENTRE FOR PHOTOGRAPHY

P.26

11AM-4PM | **FURTHER, FASTER, HIGHER**
NATIONAL MUSEUM OF FLIGHT

P.8

24 HOURS | **A HUMAN TOUCH**
THE SCOTTISH PARLIAMENT

SUNDAY 21 APRIL

RECURRING EVENTS

P.12

10AM-4PM | **EASTER TRAIL**
ROYAL BOTANIC GARDEN EDINBURGH

P.20

10AM-4PM | **ATLANTIC ADVENTURES WITH ATLAS**
DYNAMIC EARTH

P.12

10AM-5PM | **BUILD AND BREAK**
NATIONAL MUSEUM OF SCOTLAND

P.30

10.30AM, 12.30PM & 2.30PM | **ALIENS OF THE DEEP**
DYNAMIC EARTH

P.23

10AM-5PM | **INSIDE A NUCLEAR REACTOR**
NATIONAL MUSEUM OF SCOTLAND

P.28

10AM-5PM | **IVO KOHLER EXPERIENCE**
NATIONAL MUSEUM OF SCOTLAND

P.24

11AM-4PM | **THE GREENROOM**
STILLS CENTRE FOR PHOTOGRAPHY

P.26

11AM-4PM | **FURTHER, FASTER, HIGHER**
NATIONAL MUSEUM OF FLIGHT

P.8

24 HOURS | **A HUMAN TOUCH**
THE SCOTTISH PARLIAMENT

ALIENS OF THE DEEP

AGES 7+
WORKSHOP



DYNAMIC EARTH | STRATOSPHERE

10.30AM, 12.30PM AND 2.30PM | 90 MINS | ALSO ON SUN 21 APRIL | **FREE** WITH ADMISSION

Take part in a wild workshop thanks to the Marine Conservation Society. Find out more about deep-sea animals and the adaptations that help them survive in the depths then get creative and design your own 'alien of the deep'. For ages 7-11. *Workshop must be booked upon arrival.*

Presented by Dynamic Earth

Don't miss the special 30th anniversary edition of the Edinburgh International Children's Festival!

Discover the world's best theatre and dance for children and young people.

Full programme revealed and booking opens on 20 March 2019.

www.imagine.org.uk

Edinburgh International
Children's Festival
25 MAY - 2 JUNE 2019

"I love this festival. The shows we saw were utterly brilliant. They brought us pure joy and uplifted our spirits."

Parent, Festival 2018

NEWS!

Programme includes a special 3-week run of Punchdrunk's immersive show *Small Wonders*





NEW FRONTIERS

EDINBURGH SCIENCE FESTIVAL EVENTS

In 2019, Edinburgh Science Festival's events programme takes inspiration from the 50th anniversary of the Moon landings to present: *Frontiers*.

Jumping in to the unknown and expanding our horizons, our 2019 events represent the cutting-edge knowledge and passion at the forefront of science and technology. We are welcoming new ideas, new possibilities and new venues too.

Join us at the frontier at our Festival hub, The Pleasance, where you'll find debates, discussions, comedy and special events plus our ever-popular *GastroFest* series (p.54). A special pop-up bookshop from Blackwells will also be open daily.

EARLY BIRD OFFER

Buy four tickets for events across our festival programme and receive your fifth ticket free.

Cheapest ticket free, valid for five separate events only. Early Bird Tickets can be booked by phone or in person only. The Early Bird Offer closes on **Monday 25 March**.

AGE RESTRICTIONS

The following programme is designed for visitors aged 14+. This is a recommendation only and younger visitors are very welcome. Please note that a small number of events have an enforced age limit of 18+ and these will be marked with 'AGES 18+'. This restriction is in place due to event content and/or venue licensing laws. For these events, identification will be required and under 18s will not be admitted under any circumstances.

#SCIFIVE

Are you sci-curious? Students and teachers can explore our Frontiers with tickets for just £5 – everything from engaging workshops and discussions to a great night out!

Look out for the **#scifive** tag as you browse event listings and follow us on Twitter, Facebook and Instagram for more news and special offers.

 EdSciFest  EdinburghScienceFestival  EdSciFest



CHANGING PLACES MOBILOO AT PLEASANCE

On Monday 8 April and Saturday 13 April we will have a Changing Places Mobiloo at Pleasance. The Mobiloo is a mobile toilet with hoist and changing table. *Please bring your own sling if you wish to use the hoist.* www.mobiloo.org.uk

ADDITIONAL SERVICES

If you would like to request any of the following services for a specific event, please email us before Friday 8 March at marketing@scifest.co.uk prior to booking. Depending on availability.



BSL



Live Captioning



Hearing Loop (for Pleasance: Quaker Studio, Lomond Room and Upper Hall)

ROBOTS EXHIBITION



NATIONAL MUSEUM OF SCOTLAND
 10AM-5PM | FRI 18 JANUARY-SUN 5 MAY
£10/£8 UNDER 16S ARE FREE
 From early mechanised human forms to today's cutting-edge technology, this major exhibition reveals our 500-year quest to make machines human. Featuring more than 100 objects - from automata to science fiction film stars and the creations of modern research labs - this is your chance to see the most significant collection of humanoid robots ever assembled. Supported by players of People's Postcode Lottery. *Last entry 4.30pm.*
 Developed by the Science Museum, London
 Image: The Board of Trustees of the Science Museum

MICROSCOPES: NATURE REVEALED



NATIONAL MUSEUM OF SCOTLAND
 10AM-5PM | FRI 29 MARCH-SUN 15 SEPTEMBER | **FREE**
 From the simple pocket microscopes of the 18th century to the precision instruments of today, the microscope has been fundamental in improving our understanding and revealing the wonders of the natural world. Using examples from the National Museum of Scotland's significant collection, see how optical improvements sparked a change in the public perception of the microscope from being a simple optical toy to a reliable instrument of science.
 Presented by National Museums Scotland

CHARLES PIAZZI SMYTH 200

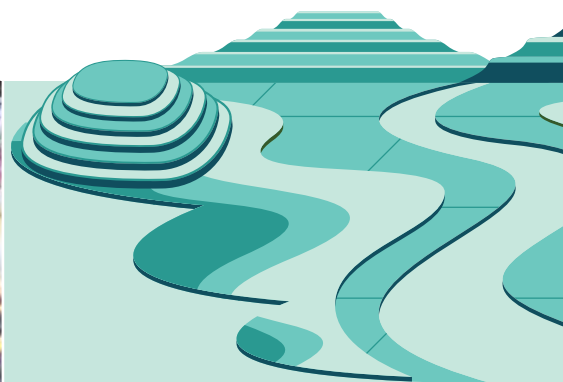


CALTON HILL | NELSON MONUMENT
 10AM-4PM | DROP-IN | MON 1 APRIL-TUE 31 DECEMBER
FREE
 Marking the bicentenary of Scottish Astronomer Royal and polymath Charles Piazzi Smyth's birth, this special exhibition presents the story of this extraordinary man whose pioneering work at Calton Hill has changed the practice of astronomy across the world. Supported by The Royal Society of Edinburgh and The Astronomical Society of Edinburgh.
 Presented by Royal Observatory Edinburgh and City Art Centre

A HUMAN TOUCH



THE SCOTTISH PARLIAMENT
 WED 20 MARCH-WED 8 MAY | DROP-IN | **FREE**
 This stunning large-scale, open-air photography exhibition will take you on a fascinating journey exploring the effect of human activity on our planet, how modern practices are changing our landscapes and impacting on the environment, and looking at some of the steps taken to cope with a rapidly changing world and dwindling resources. Learn about the urgency of rapid environmental degradation and ways to make a difference.
 In association with The Scottish Parliament
 Images: Jassen Todorov
 Supported by



CELEBRATING WOMEN IN SCIENCE IN SCOTLAND

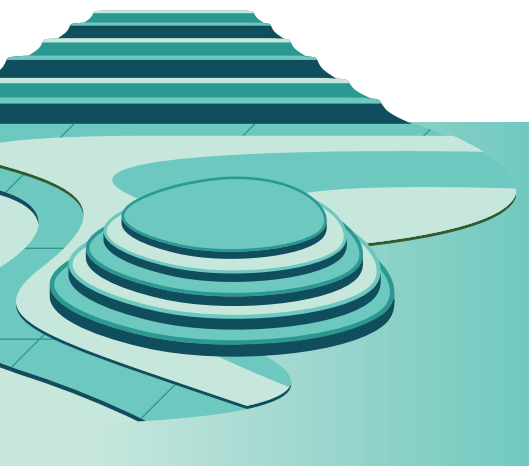


ROYAL SOCIETY OF EDINBURGH

9AM-5PM | THROUGHOUT THE FESTIVAL (MON-FRI)
DROP-IN | FREE

The Royal Society of Edinburgh is proud to present *Celebrating Women in Science in Scotland*, a new multimedia exhibition for 2019, featuring some of the country's leading scientists. These incredible women are changing the way we see and understand the world every day with their work and we want to celebrate them! Come along and find out more about what inspired them to follow this career path and the various challenges as well as achievements they have had along the way. *For dates and times please visit rse.org.uk.*

Presented by Royal Society of Edinburgh



ONGOING EXHIBITIONS	
P.33	9AM-5PM CELEBRATING WOMEN IN SCIENCE ROYAL SOCIETY OF EDINBURGH
P.32	10AM-4PM CHARLES PIAZZI SMYTH 200 CALTON HILL

P.32	10AM-5PM ROBOTS EXHIBITION NATIONAL MUSEUM OF SCOTLAND
P.32	10AM-5PM MICROSCOPES: NATURE REVEALED NATIONAL MUSEUM OF SCOTLAND
P.32	24 HOURS A HUMAN TOUCH THE SCOTTISH PARLIAMENT

METAMORPHOSIS

EXHIBITION



SUMMERHALL

LAUNCH: FRI 5 APRIL | 6.30PM-8.30PM

EXHIBITION: SAT 6-SUN 21 APRIL | WED 24 APRIL-SUN 19 MAY (NOT MON & TUES) | 11AM-6PM | DROP-IN | FREE

Metamorphosis is a contemporary art exhibition co-curated by Summerhall and ASCUS Art & Science, showcasing new work of local and international artists **Louise Mackenzie**, **Russell Beard**, **Stephen Kavanagh** and **Aurélie Fontan**. Working across the fields of art, design and science, these works explore where we are today after centuries of engineering the world and environment around us, begging the question what impact has this had and where should we, as humans, go from here? *See p.35, p.36, p.38 and p.40 for the corresponding artist talks and workshops.*

Presented by Summerhall, ASCUS Art & Science and Lateral Lab

Image: Jason Revell

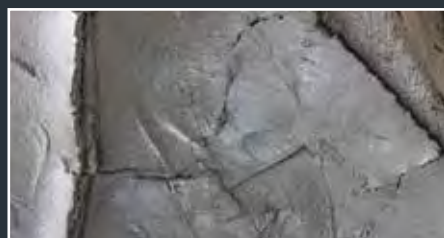
TENSEGRITY



What is the fashion of the future? Upcoming designer **Aurélie Fontan** created her own 100% degradable fabric from speciality tea, Kombucha. Her Edinburgh College of Art graduate collection *Tensegrity* demonstrates the combination of craft and technology based on science imagery and disciplines.

Presented by Summerhall and ASCUS Art & Science

FRAG'MENT (TERRA NON-FIRMA)



Emerging from the social, geopolitical and environmental uncertainty of the 'Anthropocene' time period - *Frag'ment (Terra Non-Firma)* brings together two recent recipients of Lateral Lab's Robert Callender International Residency for Young Artists, **Russell Beard** and **Stephen Kavanagh**. In this joint exhibition, they explore the space between order and chaos, growth and disintegration. The series of sculptural works charts the artists' ongoing experimentation with raw materiality.

Presented by Summerhall, ASCUS Art & Science and Lateral Lab

Image: Stephen Kavanagh



PITHOS: ONE POSSIBLE STORY OF OUR LIVELY MATERIAL



Visual artist **Louise Mackenzie** reimagines the myth of Pandora for a biotechnical era in this exhibition of her works. Following three years of research with the Institute of Genetic Medicine at Newcastle University and ASCUS Lab at Summerhall, Mackenzie delves into film and participatory performance and uses her experience of genetically modifying *E. coli* bacteria to confront issues of care and control.

Presented by Summerhall and ASCUS Art & Science

Image: Louise Mackenzie

EDINBURGH MEDAL ADDRESS CLIMATE CHANGE: WHERE ARE WE?

FESTIVAL EVENTS

BOOKING HOTLINE: 0131 226 0005

ONLINE BOOKING: SCIENCEFESTIVAL.CO.UK

SPECIAL EVENT



THE SIGNET LIBRARY | UPPER LIBRARY
7PM | 1 HOUR | £12/10

The Edinburgh Medal is a prestigious award given each year to men and women of science and technology who are judged to have made a significant contribution to the understanding and wellbeing of humanity. The 2019 Edinburgh Medal is awarded to **Christiana Figueres**, for her work as a recognised world leader on global climate change and her efforts in bringing nations together to jointly deliver an unprecedented climate change agreement.

Christiana Figueres, Executive Secretary of the UN Framework Convention on Climate Change (UNFCCC), was instrumental in the successful conclusion of the Paris talks. The Summit saw all of the world's nations agree for the first time to a binding commitment to avoid dangerous levels of global warming. Figueres served as the UN's Climate Chief from 2010 until July 2016.

Join Figueres as she discusses the international picture in respect of action to halt climate change. The 2015 Paris Agreement was a historic achievement of international cooperation that charted a course toward addressing global climate change. Since then, some political events have called that international cooperation into question.

Supported by



PREVIOUS RECIPIENTS

- 2018 Prof Cordelia Fine
- 2017 Prof Peter Piot
- 2016 Kevin Govender and the IAU
- 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 Patarroyo
- 1993 Prof Wangari Maathai
- 1992 Prof Heinz Wolff
- 1991 Prof Jane Goodall
- 1990 Prof Stephen J Gould
- 1989 Prof Abdus Salam

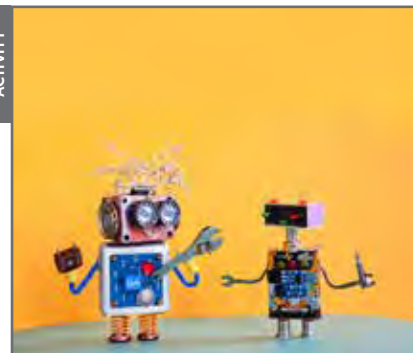
ONGOING EXHIBITIONS

P.33

9AM-5PM | CELEBRATING WOMEN IN SCIENCE
ROYAL SOCIETY OF EDINBURGH

BUILD AND BREAK

ACTIVITY



NATIONAL MUSEUM OF SCOTLAND

10AM-5PM | SAT 6-SUN 21 APRIL | DROP-IN | FREE

Build, break and create in our unique free play session. Visit *BUILD IT* to unlock your creative spirit and build magical, massive structures with our super-sized construction blocks then head over to *BREAK IT* to be set loose on a huge pile of discarded electronics with a screwdriver and a pair of pliers - rip old pieces of tech apart to discover what they are made of and learn which parts we might be able to reuse. *Due to the nature of the activities, adult supervision is required. To provide an accessible environment for families with autistic children and children with complex sensory profiles we are hosting two early doors sessions at the National Museum of Scotland (p.26).*

Supported by



MOMENTS IN TIME

EXHIBITION



PLEASANCE | PLEASANCE COURTYARD

10AM-8PM | DROP-IN | SAT 6-SUN 14 APRIL | FREE

Allow yourself to be transported back in time as we take you on a journey through pivotal moments in Scotland's history. Through a series of immersive snapshots, discover milestones of Scottish scientific achievement from the flowering of philosophy and science during the Enlightenment, through the rapidly mechanising world of the Industrial Revolution, to the data-rich and globally connected Information Age.



P.32

10AM-4PM | CHARLES PIAZZI SMYTH 200
CALTON HILL

P.32

10AM-5PM | ROBOTS EXHIBITION
NATIONAL MUSEUM OF SCOTLAND

P.32

10AM-5PM | MICROSCOPES: NATURE REVEALED
NATIONAL MUSEUM OF SCOTLAND

P.33

11AM-6PM | METAMORPHOSIS
SUMMERHALL

P.32

24 HOURS | A HUMAN TOUCH
THE SCOTTISH PARLIAMENT

FOOD FOREVER



ROYAL BOTANIC GARDEN EDINBURGH

JOHN HOPE GATEWAY

10AM-5.30PM | DROP-IN | ON UNTIL SUN 21 APRIL

FREE

The global spread of crops has linked continents and cultures as we have taken edible plants with us on our travels. The *Food Forever* exhibition uses large photographic images to explore the importance of diversity in crops and their wild relatives, for resilience and food security.

Presented by Royal Botanic Garden Edinburgh

CYANOTYPE WORKSHOP



PLEASANCE | HIGHLAND ROOM

11AM AND 2PM | 2 HOURS | £12/£10

Enjoy one of the first photographic printing processes and create your own beautiful design to take away. **Sheila Noble Woodward** of wREN Fine Art Photography joins us to make amazing cobalt blue images using the historic cyanotype printing process. Hand-coat watercolour paper, design a collage of plant material or other objects of your choice and expose it to the sun (or an alternative UV light source if the sun doesn't come out) to see the beautiful reaction at work.

THE MIRROR TRAP



PLEASANCE

11AM-6PM | DROP-IN | ON UNTIL SUN 14 APRIL

FREE

A short headphone horror story about psychology and quantum physics. Paul Gato locked himself in his room. When police finally battered down the door, they found a gun, two mirrors, a vial of LSD and a diary full of ramblings and Feynman diagrams, but Gato had disappeared. His diary proves that he had lost his mind but perhaps he found something else. Dare you re-enact his final experiment?

AURÉLIE FONTAN:
ARTIST TALK

SUMMERHALL | RED LECTURE THEATRE

1PM | 1 HOUR | £5

Inspired by the social and environmental impact of fast fashion, sustainable fashion designer **Aurélien Fontan** discusses her cutting-edge garments inspired by science and biodesign and how these sustainable materials can reshape the industry. *This venue is undergoing access improvements, contact the venue for up-to-date information.*

Presented by Summerhall and ASCUS Art & Science

Image: Aurélie Fontan

EXPLORING THE DEEP



NATIONAL MUSEUM OF SCOTLAND | AUDITORIUM

12PM | 90 MINS | £8.50/£6.50

Despite over 50 years of deep-sea exploration, less than 1% of the global deep ocean has ever been visited. However, that very small fraction has yielded new ecosystems, abundant resources and the possible birthplace of life on Earth. Trinidadian marine biologist specialising in deep-sea biology **Dr Diva Amon** hosts a panel of experts including **Amber Cobley** and **Dr Allison Perry** who recall their own adventures into the unknown and discuss what the future holds for the deep.

Supported by **OCEANA** Protecting the World's OceansFROM BIOHAZARD
TO BIOFUEL

PLEASANCE | LOMOND ROOM

2PM | 90 MINS | £8.50/£6.50/#SCIFIVE £5

As traditional fossil fuels continue to fall out of favour, scientists are instead turning to new and unusual energy sources such as fatbergs, algae and even bacteria that eat human waste. In a discussion chaired by director of Creative Carbon Scotland **Dr Ben Twist**, join Argon Energy's **Dickon Posnett** and **Prof Yanniss Ieropoulos** of the Bristol BioEnergy Centre, to measure the power generated from weird and wonderful materials.

CABARET OF DANGEROUS
IDEAS: PROVOCATIONS FOR
A SUSTAINABLE FUTURE

EDINBURGH CENTRE FOR CARBON INNOVATION

CONFERENCE ROOM

2PM | 90 MINS | £5

Join us as some of our brightest and bravest thinkers let their most challenging sustainability ideas loose on the public! Questions and challenges are actively encouraged and there'll be a liberal sprinkle of entertainment from MC and comedian **Susan Morrison**. You'll also have a chance to view a series of short environmental films created by students from Edinburgh College of Art. The *Cabaret of Dangerous Ideas* will give you the opportunity to engage with cutting-edge knowledge in the entertaining way you've been waiting for.

Presented by The University of Edinburgh and the Edinburgh Centre for Carbon Innovation

RUSSELL BEARD: ARTIST TALK



SUMMERHALL | RED LECTURE THEATRE

2.30PM | 1 HOUR | £5

Join artist **Russell Beard** as he discusses his joint exhibition with Stephen Kavanagh presenting new sculptural works and the challenges emerging from the social geo-political and environmental uncertainty of the Anthropocene – an era of the dominant influence of human activity on the environment. *This venue is undergoing access improvements, contact the venue for up-to-date information.*

Presented by Summerhall, ASCUS Art & Science and Lateral Lab

Image: Russell Beard

CRACKING THE
CANCER CODE

PLEASANCE | UPPER HALL

3PM | 1 HOUR | £6/#SCIFIVE £5

As scientists turn to big data and Artificial Intelligence to crack the cancer code, we find ourselves on the brink of personalised medicine and targeted treatments. Test Cancer Research UK's escape game and hear about the latest advances from cancer scientists as you race against the clock to solve a series of puzzles using the tools and techniques of research.

Presented by Cancer Research UK

MAXWELL IN SIX OBJECTS



NATIONAL MUSEUM OF SCOTLAND | AUDITORIUM
3PM | 90 MINS | £8.50/£6.50/#SCIFIVE £5

James Clerk Maxwell is up there with the likes of Newton and Einstein but his achievements and life are little known, even in his native Scotland. Focused around six objects associated with Maxwell, **Dr Isobel Falconer** presents key aspects of his life and scientific work. These objects, on loan from the Cavendish Laboratory and the James Clerk Maxwell Foundation, provide insights into the personality and modes of thought of this great physicist.

Supported by **JAMES CLERK MAXWELL FOUNDATION**

ANIMALS IN RESEARCH: ANY ALTERNATIVES?



PLEASANCE | CABARET BAR
3PM | 90 MINS | £8.50/£6.50/#SCIFIVE £5

Animal research has played a vital part in nearly every medical and veterinary breakthrough, but what alternatives exist? Quiz our panel of experts to find out about ways of reducing the use of animals in research, how to maximise welfare and explore the possibilities of alternatives. Speakers include **Dr Lesley Penny**, Director of Bioresearch and Veterinary Services at the University of Edinburgh, **Hazel Lambert** from the College of Medicine and Veterinary Medicine at the University of Edinburgh and critical care medicine consultant **Dr Kenneth Baillie**. Supported by the Medical Research Council.

Presented by The University of Edinburgh

LOUISE MACKENZIE: ARTIST TALK



SUMMERHALL | RED LECTURE THEATRE
4PM | 1 HOUR | £5

With a background in psychology and an interest in philosophy, **Louise Mackenzie** explores human behaviour and the evolution of society through art practice. Taking human-made objects as a starting point for exploration, we discuss Mackenzie's recent work focusing on aspects of biological matter that she describes as 'lively material'. *This venue is undergoing access improvements, contact the venue for up-to-date information.*

Presented by Summerhall and ASCUS Art & Science

PUTTING INTELLIGENCE TO THE TEST



PLEASANCE | QUAKER STUDIO
5.30PM | 90 MINS | £8.50/£6.50/#SCIFIVE £5

Are you as smart as you think you are or are there ways to increase your intelligence? How did humans become so brainy and how accurately can we really test intelligence anyway? Join our panel of experts including **Dr Adam Hampshire** to hear how Artificial Intelligence can help to define intelligence from a mechanistic perspective, while **Dr Amanda Seed** will explore the evolution of human intelligence compared to other animals, and author of *The Intelligence Trap*, **David Robson**, will talk about the stupid things smart people do.

BENEDICT ALLEN: ULTIMATE EXPLORER



PLEASANCE | PLEASANCE THEATRE
5.30PM | 90 MINS | £12/£10

Benedict Allen, famously the subject of mass media speculation when he was 'lost' in Papua New Guinea some 18 months ago, tells the gripping story of that harrowing journey and the extraordinary discoveries he made there with his usual good humour. He talks about what first motivated him to become an explorer, the physical and mental endurance that his numerous challenges have required and his work documenting some of the most remote people and environments on the planet.

CAN SCIENCE EXPLAIN MUSIC?



PLEASANCE | CABARET BAR
5.30PM | 90 MINS | £8.50/£6.50/#SCIFIVE £5

Physicists study vibrations and the physical mechanisms of making music and neuroscientists visualise our brain activity when listening to it. But is music ever going to be something that can be understood or explained using science? Arguing yes is physicist and musician **Mark Lewney** against an emphatic no from neuroscientist, doctor and philosopher **Raymond Tallis**.

THE SCIENCE OF THE SESH



SUMMERHALL | DISSECTION ROOM
7.30PM | 2 HOURS | £28 INCLUDES WELCOME COCKTAIL

Join us for an evening of delicious drinks, boozy (but responsible) experiments and cocktail history as we explore *The Science of the Sesh!* Discover what factors and senses affect how we taste, how to make perfect cocktails at home and sip on some beautiful drinks made with the best Scottish spirits as you learn. *Over 18s only. This venue is undergoing access improvements, contact the venue for up-to-date information.*

Hosted by Summerhall Drinks Lab

IS THAT A BIG NUMBER?



PLEASANCE | LOMOND ROOM
8PM | 1 HOUR | £8.50/£6.50/#SCIFIVE £5

Impressive statistics are thrown at us every day from the cost of healthcare, the size of an earthquake to the distance to the nearest star. Financial technology entrepreneur **Andrew Elliott** gives the tips and tools to make sense of these numbers. Join us to learn how number skills help us to understand the everyday world and how the same skills can be stretched to solve mysteries of science, politics and the Universe.

Presented by Oxford University Press

OCEANS IN CRISIS: A PUBLIC DEBATE



PLEASANCE | QUAKER STUDIO
8PM | 90 MINS | £8.50/£6.50/#SCIFIVE £5

We all rely on the seas for their abundant food, mineral and energy resources and yet more than 90% of the deep oceans remain totally unexplored. From microplastics to rising sea levels, human activity is changing our oceans before we have the chance to explore its full potential. Join our panel of ocean experts to discuss the challenges we face and better understand our ocean world.

Presented by Heriot-Watt University

12 YEARS TO SAVE THE PLANET

DISCUSSION



PLEASANCE | PLEASANCE THEATRE

8PM | 90 MINS | £8.50/£6.50/#SCIFIVE £5

In 2018, top environmental scientists issued a final call to save the world from catastrophic climate change. They argue 'rapid, far-reaching and unprecedented changes in all aspects of society' are necessary to prevent global temperatures from rising more than 1.5°C above pre-industrial levels. We present a panel of climate experts and figures from the worlds of energy and industry who propose their plans for combatting this complex issue.

CHEESEOLGY 4.0

SPECIAL EVENT



PLEASANCE | UPPER HALL

8PM | 90 MINS | ALSO ON SUN 7 APRIL AT 2PM

£15 INCLUDES CHEESE SAMPLES

Cheeseology returns to the Science Festival for a fourth year to explore the science behind the production of this fascinating food. Hosted by dairy technologist **Paul Thomas** and journalist and cheese expert **Patrick McGuigan**, *Cheeseology* combines a tutored tasting of some of Europe's finest cheeses with an explanation of the factors influencing texture and flavour development in each variety.

LIFE ON MARS

AGES 18+
ACTIVITY



PLEASANCE | CABARET BAR

8PM | 2 HOURS | £8.50/£6.50/#SCIFIVE £5

Join science presenter **Neil Monteiro** to build a new life on Mars in this pub quiz, board game and sci-fi mashup! Divide up resources, develop structures and prepare to live on the edge whilst dealing with on-screen random events. You'll need to bring your best space and sci-fi brains for the knowledge and dexterity challenges. Come prepared with a team of four to eight people or simply bring a willingness to join in and submit your name to the team creator on the night. *Over 18s only.*

SCIENCE NEEDS YOU!



SHARE YOUR PASSION FOR SCIENCE

Our vision is of a world where science, technology, engineering and mathematics are recognised and celebrated as central to our lives and where we all work together to create a sustainable future.

You can be part of delivering Edinburgh Science Festival as well as community outreach and learning projects across Scotland. You can help to inspire the next generation to become the problem solvers of tomorrow.

We are Scotland's largest science engagement charity but we cannot continue our work without support.

Please look out for our *Donation Stations* at Science Festival venues to help us to deliver a world-leading Festival and our education projects across Scotland.

Get in touch for more information and to discuss the benefits of partnering with Edinburgh Science by contacting Hannah at hannah.schlesinger@scifest.co.uk

Registered Charity no. SC003790

Science and technology are integral to the Scottish economy. Digital technology is Scotland's fastest-growing sector and employment opportunities across all science and technology sectors are on the rise.

Yet we face a shortage of skills; young people are not choosing to study the science and technology that could lead to exciting and creative careers as inventors, designers, builders and lifesavers.

Flick through the pages of this programme and you see how incredible and far-reaching science is. Even if you or your organisation are not directly linked to science and technology, you will have benefited from it (through email, mobile phones and health).



FIG 1. SCIPALS ROSALYN YALOW AND JAMES DEWAR DEMONSTRATE A SUCCESSFUL #SCIFIVE!

TEACHERS AND STUDENTS £5 TICKETS!

Are you sci-curious? Students and teachers can explore everything – from engaging workshops and discussions to a great night out – for just £5 at most events.

Look out for the **#scifive** tag as you browse event listings.

Follow us on Twitter, Facebook and Instagram for more news and special offers.

[EdSciFest](#) [EdinburghScienceFestival](#) [EdSciFest](#)

ONGOING EXHIBITIONS

P.33	9AM-5PM CELEBRATING WOMEN IN SCIENCE ROYAL SOCIETY OF EDINBURGH	P.34	10AM-5PM BUILD AND BREAK NATIONAL MUSEUM OF SCOTLAND	P.32	24 HOURS A HUMAN TOUCH THE SCOTTISH PARLIAMENT
P.32	10AM-4PM CHARLES PIAZZI SMYTH 200 CALTON HILL	P.35	10AM-5.30PM FOOD FOREVER ROYAL BOTANIC GARDEN EDINBURGH	RECURRING EVENTS	
P.32	10AM-5PM ROBOTS EXHIBITION NATIONAL MUSEUM OF SCOTLAND	P.33	11AM-6PM METAMORPHOSIS SUMMERHALL	P.35	11AM-6PM THE MIRROR TRAP PLEASANCE
P.32	10AM-5PM MICROSCOPES: NATURE REVEALED NATIONAL MUSEUM OF SCOTLAND	P.34	10AM-8PM MOMENTS IN TIME PLEASANCE	P.37	2PM CHEESEOLOGY 4.0 PLEASANCE

FESTIVAL EVENTS

BOOKING HOTLINE: 0131 226 0005

ONLINE BOOKING: SCIENCEFESTIVAL.CO.UK

SCIENCE FESTIVAL CHURCH SERVICE



ST GILES CATHEDRAL

11.30AM | 1 HOUR | FREE

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

EVERY BREATH YOU TAKE



NATIONAL MUSEUM OF SCOTLAND | AUDITORIUM

12PM | 2 HOURS | £8.50/£6.50/#SCIFIVE £5

Air pollution is in the news daily and in the UK, 40,000 deaths each year are linked to this growing problem. Join **Prof D K Arvind** to learn about the exciting new development of wearable sensors to measure air pollution and its effects on vulnerable groups, such as young asthmatics, pregnant mothers and patients with chronic obstructive respiratory disease. After the discussion, have a go at wearing the devices on a walk around the museum to visualise your personal dosage of air pollutants.

Presented by The University of Edinburgh

SCIENCE IS BEAUTIFUL



ROYAL BOTANIC GARDEN EDINBURGH

LECTURE THEATRE

2PM | 1 HOUR | £5

Through the ages plants have been associated with beauty. Microscopes reveal that what's true of plants in our everyday experience is also true of their micro-structure. Things that are invisible to the naked eye turn out to be stunningly beautiful. Join **Colin Salter**, author of *Science is Beautiful: Botanical Life* and botanist **Dr Louis Ronse De Craene** for a journey into the inner workings of plants.

Presented by Royal Botanic Garden Edinburgh

THE SCIENCE OF COLD WATER SWIMMING



PLEASANCE | LOMOND ROOM

2PM | 90 MINS | £8.50/£6.50/#SCIFIVE £5

Taking a dive into chilly waters has become increasingly popular across the UK. Intrepid Scottish wild swimmer **Calum Maclean** hosts a panel including anaesthetist and researcher into the therapeutic benefits of cold water swimming **Dr Mark Harper**, thermal physiology expert **Dr Clare Eglin** and **Adrian Mayhew** of Surf Life Saving GB to discover the science behind claims that an icy dip can help improve your physical and mental health, what happens to your body in cold water and how to assess conditions for a safe outdoor swim.

TENTACULAR RESONANCES



SUMMERHALL | ASCUS LAB

2PM AND 6PM | 3 HOURS | £15

Artist **Louise Mackenzie** uses sound and new media to explore our entangled relationship with lively materials. Explore the material relationship between resonance and form through the technique of sonoporation – a means to alter the DNA of living organisms using sound. Work with your own DNA, text, copper wire and DIY technology to create and record DNA poems that will be used to generate soundscapes for an interactive installation. *This venue is accessible by 29 steps.*

Presented by Summerhall and ASCUS Lab

Image: Louise Mackenzie

THE DOC, THE MARSHAL AND THE GREAT YEAR OF LIGHT



PLEASANCE | CABARET BAR

3PM | 1 HOUR | £8.50/£6.50/#SCIFIVE £5

Tombstone, Arizona, famous for the OK Corral gunfight, also had a scientific society, one of whose leading members was an American pioneer of geology and medicine. The town faded away in 1887, the same year that the foundations for Einstein's theory of relativity were laid with the confirmation of James Clerk Maxwell's model of light as an electromagnetic wave. **Dr Howie Firth** tells the story of Tombstone, Doc Holliday, Marshal Wyatt Earp and the great year of 1887.

COSMIC BEAUTY. POETRY & SCIENCE



NATIONAL MUSEUM OF SCOTLAND | AUDITORIUM

3PM | 90 MINS | £8.50/£6.50/#SCIFIVE £5

Celebrating the publication of their book *Oor Big Braw Cosmos*, join Astronomer Royal for Scotland **Prof John C Brown** and eminent Lallans poet **Rab Wilson** for a session of poetry and an exploration of astronomy, cosmic beauty and science to a backdrop of superb cosmic imagery.

THE NAKED SCIENTISTS LIVE PODCAST



PLEASANCE | PLEASANCE THEATRE

3PM | 1 HOUR | £8.50/£6.50/#SCIFIVE £5

The Naked Scientists, one of the world's most popular science podcasts, is exploring science, technology and medicine. Come along for your fix of science stories and have your most puzzling questions answered by the (fully clothed!) *Naked Scientists* live radio show.

THE BUZZ ABOUT GM INSECTS



PLEASANCE | QUAKER STUDIO

3PM | 90 MINS | £8.50/£6.50/#SCIFIVE £5

In Scotland the discussion around genetic modification (GM) has come to a head for crops, but what about other living things? GM insects are changing the way we look at public health and could contribute to large-scale changes to our world. Find out more about these modified insects and how, over time, they may wipeout infectious diseases altogether with **Grey Frandsen**, CEO of Oxitec, creators of the Friendly™ Mosquitoes, **Prof Luke Alpey** of the Pirbright Institute and **Prof Helen Sang** of the Roslin Institute.

Supported by



GENE MACHINE



PLEASANCE | PLEASANCE THEATRE

5.30PM | 1 HOUR | £8.50/£6.50/#SCIFIVE £5

DNA is the essence of our being, influencing who we are and what we pass on, but the information in DNA can't be decoded without the ribosome. Older than DNA itself, virtually every molecule was either made by the ribosome or by proteins that were themselves made by the ribosome. Nobel prize winner, **Sir Venki Ramakrishnan** tells the story of the race to uncover the ribosome's complex structure, a fundamental breakthrough that resolves the ancient mystery of life itself.

Presented by OneWorld Publications

REVENGE OF THE TWITTERBOTS!



PLEASANCE | QUAKER STUDIO

5.30PM | 1 HOUR | £8.50/£6.50/#SCIFIVE £5

Do you know who follows you? Twitter offers a unique medium for creativity and curiosity for humans and machines and tweets from autonomous software systems are becoming more common. Computer scientist **Tony Veale** examines the world of Twitterbots, from botdom's greatest hits to the hows and whys of bot-building, discover the place for bots in the social media landscape.

Presented by MIT Press

WELCOME TO TECH TOWN



PLEASANCE | LOMOND ROOM

5.30PM | 90 MINS | £8.50/£6.50/#SCIFIVE £5

Some cities have already started doing it. Most cities are thinking about how they can too. As Artificial Intelligence technology and the potential to automate tasks like cleaning, deliveries and transport develops, what will the cities of the future look like? Join **Dr Mateja Kovacic** and host **Francesca Perry** to look into some existing robo-cities and discuss how Scotland's cities might adapt themselves for the future.

THE OCEAN AND US



PLEASANCE | CABARET BAR

5.30PM | 2 HOURS | £10/£8/#SCIFIVE £5

From art to oxygen, wellbeing to food, humans and the ocean are inextricably intertwined. Join us for a fun and joyful celebration of the ocean and what it means to us, featuring performances from talented Scottish musicians and comedy poets alongside short talks from top researchers about how we interact with the sea.

HOW OUR BRAIN SHAPES WHO WE ARE



PLEASANCE | QUAKER STUDIO

8PM | 1 HOUR | £8.50/£6.50/#SCIFIVE £5

Leading neuroscientist, author and popular science blogger **Prof Kevin Mitchell** traces human diversity and individual differences to their deepest level: in the wiring of our brains. Explore the genetic and neural underpinnings of conditions such as autism, schizophrenia and epilepsy and examine the social and ethical implications of new technologies to predict or manipulate human traits.

Presented by Princeton University Press

IDEAS ON THE EDGE



PLEASANCE | LOMOND ROOM

8PM | 90 MINS | £8.50/£6.50/#SCIFIVE £5

Augmented and virtual reality used to seem like wild ideas of the future but we are now living in the world of this cutting-edge work. Join our panel, including experts in blending real and digital worlds, **Prof Kenny Mitchell** and **Dr Tom Flint** to explore where the virtual can take you next.

SECRETS OF SEAFOOD



PLEASANCE | UPPER HALL

8PM | 90 MINS | £15 INCLUDES SEAFOOD SAMPLES

Scotland has a longstanding love of seafood, with its harbours and fishing villages supplying our fishy feasts for countless years. But what other edible treats can the sea offer, and how can we ensure our stocks are sustainable? Come along to learn some surprising science from the Marine Conservation Society's **Tara Proud**, Slate Island Seaweed's **Dr Duncan Smallman**, and marine biologist **Dr Tara Marshall** and try out some Scottish seafood fare! *If you need to discuss dietary requirements, get in touch with our box office prior to booking.*

FAKE MOON LANDINGS AND OTHER PERSISTENT CONSPIRACIES



PLEASANCE | CABARET BAR

8.30PM | 90 MINS | £8.50/£6.50/#SCIFIVE £5

From fake news to national tragedies, conspiracy theories are always close behind. If you've ever questioned the Moon landing or the September 11 attacks, if you're curious about lizard people and disaster actors, then this event is for you. Join conspiracy theory experts **Prof Peter Knight** and **Prof Robbie Sutton** to find out where these conspiracies come from, how they take root and what makes people believe them.

ONGOING EXHIBITIONS

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FESTIVAL EVENTS

BOOKING HOTLINE: 0131 226 0005

ONLINE BOOKING: SCIENCEFESTIVAL.CO.UK

A VERY SHORT INTRODUCTION TO... GLACIATION



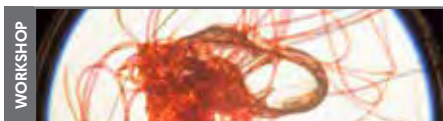
PLEASANCE | CABARET BAR

1PM | 1 HOUR | £6/#SCIFIVE £5

Vast and majestic, glaciers lock up 10% of the world's freshwater. These great bodies of ice play an important part in the Earth's development, carving landscapes, influencing climate and affecting global sea level. Glacial geomorphologist **Prof David Evans** considers how glaciers and ice sheets have shaped our planet and the role they play today.

Presented by Oxford University Press

MICROFIBRES, MICROORGANISMS AND DESIGN



SUMMERHALL | ASCUS LAB

2PM AND 6PM | 3 HOURS | £15

Designer **Aurélie Fontan** uses microbiology and scientific imagery to inform her design process, sometimes using living organisms to create textiles. Join the conversation about fashion and sustainability, capture your own scientific imagery and explore how Kombucha, often more well known as a fermented drink, can be transformed into wearable fashion. *This venue is accessible by 29 steps.*

Presented by Summerhall and ASCUS Lab

Image: Aurélie Fontan

SONGS FOR SCIENCE EDUCATION



PLEASANCE | LOMOND ROOM

5.30PM | 1 HOUR | £8.50/£6.50/#SCIFIVE £5

In a humorous and song-studded talk, science troubadour **Jonny Berliner** explains how he uses the art of songwriting to make science accessible and entertaining for all. His unique brand of science comedy has helped Berliner appear alongside some of the world's leading science communicators, become a science teacher, education researcher and a TEDx presenting advocate for using songs to educate.

THE WORLD WIDE WEB: WHERE IT CAME FROM



PLEASANCE | QUAKER STUDIO

5.30PM | 1 HOUR | £8.50/£6.50/#SCIFIVE £5

Generally accepted as the greatest innovation in human communication, the world wide web's original concepts were developed by pioneers in the 1960s and brought to market in the 1980s at the same time the internet became publicly available. Join **Ian Ritchie**, founder of OWL, who helped pioneer the world's first Hypertext product for the delivery of documents intended for the computer screen, to hear about his journey on the web.

WHERE THE HELL IS MY HOVERBOARD?



PLEASANCE | CABARET BAR

5.30PM | 90 MINS | £8.50/£6.50/#SCIFIVE £5

If you've seen films like *Back to the Future* or *Blade Runner* you might be wondering why we aren't all zipping around on hoverboards or getting stuck in flying traffic jams. We've invited a panel of experts and enthusiasts, including robotics researcher **James Garforth**, future-tech enthusiast and journalist **Dave Hall** and engineering researcher **Dr Adam Stokes**, to discuss where technology is at and what hurdles we still have to overcome before we can live out our sci-fi dreams. There will also be the opportunity to taste some 3D printed food, courtesy of Cambridge company Nūfood.

THE CONSOLATIONS OF PHYSICS



PLEASANCE | PLEASANCE THEATRE

5.30PM | 1 HOUR | £8.50/£6.50/#SCIFIVE £5

In an age where uncertainty and division is rife, **Tim Radford**, former science editor of *The Guardian*, turns to the wonders of the Universe for consolation. Guiding us through the vast unknown from a tiny particle to the grand marvels of space, this event is perfect for space fanatics and meaning of life explorers. Chaired by writer and science communicator, **Hazel Lambert**.

Presented by Hodder and Stoughton

HERE COMES THE SUN



DISCUSSION

PLEASANCE | PLEASANCE THEATRE
8PM | 1 HOUR | **£8.50/£6.50/#SCIFIVE £5**

Edinburgh and Glasgow have been dubbed the least sunny large cities in the world. Join leading geneticist and author **Prof Steve Jones** (who spent almost a decade in Edinburgh) to hear about the good, the bad and the possibly deadly results of our grey weather and why we should increase our exposure to sunlight when we can. Does our lack of sunshine impact our liability to rickets, multiple sclerosis or even cancer?

THE SCIENCE OF SIN



DISCUSSION

PLEASANCE | CABARET BAR
8PM | 1 HOUR | **£8.50/£6.50/#SCIFIVE £5**

It's a hard battle to fight our temptations. But where do these urges come from? Exploring the themes in his new book, *The Science of Sin*, neurobiologist, TV presenter and podcaster **Dr Jack Lewis** combines the latest neuroscience research and the seven deadly sins to look at the science behind why we are constantly tempted to do the things we know aren't good for us. Lewis suggests strategies to help us better manage our impulses in order to improve our health, our happiness and our productivity. Presented by Bloomsbury Publishing

DIAGNOSING WITH DATA



DISCUSSION

PLEASANCE | QUAKER STUDIO
8PM | 90 MINS | **£8.50/£6.50/#SCIFIVE £5**

Every time you visit the doctor or hospital you generate medical data. For Edinburgh BioQuarter, a leading health and science campus focusing on medical research, 'big data' is essential in exploring modern health care. Join Chair of Cardiology and Consultant Cardiologist **Prof Nicholas Mills**, ethics of medical research expert **Dr Sarah Chan** and **Dr Angus Ferguson** from the Public Benefit and Privacy Panel for Health and Social Care, as we discuss digital healthcare data and its future.

Supported by



OCEAN POWER



DISCUSSION

PLEASANCE | LOMOND ROOM
8PM | 90MINS | **£8.50/£6.50/#SCIFIVE £5**

What's the deal with ocean power? With the UK poised to be a world leader in the field, industry experts **Beth Dickens**, **Taylor McKenzie**, **Cameron McNatt** and **Neil Kermod**, discuss tidal, wave and offshore wind power. Hosted by comedian **Cerys Bradley**.



Lise Melner



Annie Easley



Stephanie Kwolek



Emmy Noether

We are proud to champion the achievements of women in science and science communication, and strive for a balanced representation of gender in our programming.

Often considered male dominated industries, women are working, growing and thriving in STEM roles. From celebrating the actions of *The Edinburgh Seven* (p.44), an inspiring group of women who broke through barriers to become the first to study medicine in the UK, to investigating world issues with female industry-leaders like *Christiana Figueres* (p.34), our programme strives to inspire, encourage and educate women and girls of all ages about the opportunities available to them within STEM industries.

So if you're looking for inspiration, look no further than this hand-picked selection of events. *The Gendered Brain* (p.44) gives us insight into the biological differences and similarities between the sexes; discover the pioneers who inspired *The Untold Stories of Women in Engineering* (p.45); and learn of the trials, tribulations and successes of *Being a Woman in Science* (p.53).

Make sure you visit Pleasance Courtyard to explore *Moments in Time* (p.13) and learn of the Scottish scientific milestones through history including landmark contributions from women. And to top off a female-led journey, the Royal Society of Edinburgh is *Celebrating Women in Science* all Festival long (p.33).

ONGOING EXHIBITIONS

P.33 9AM-5PM | CELEBRATING WOMEN IN SCIENCE
ROYAL SOCIETY OF EDINBURGH

P.32 10AM-4PM | CHARLES PIAZZI SMYTH 200
CALTON HILL

P.32 10AM-5PM | ROBOTS EXHIBITION
NATIONAL MUSEUM OF SCOTLAND

P.32 10AM-5PM | MICROSCOPES: NATURE REVEALED
NATIONAL MUSEUM OF SCOTLAND

P.34 10AM-5PM | BUILD AND BREAK
NATIONAL MUSEUM OF SCOTLAND

A VERY SHORT INTRODUCTION TO... SYNTHETIC BIOLOGY



DISCUSSION

PLEASANCE | CABARET BAR

1PM | 1 HOUR | £6/#SCIFIVE £5

Synthetic biology affects fields of science as diverse as drug manufacture, biofuel production, tackling pollution and medical diagnostics. It may even make it possible for us to create new life from non-living materials. Experimental anatomist **Prof Jamie Davies** discusses the considerable controversies the opportunities that this fast-growing field of research brings.

Presented by Oxford University Press

THE SCIENCE OF GIN AND TONIC



AGES 18+

TOUR

SUMMERHALL | SUMMERHALL DISTILLERY

2PM AND 4PM | 1 HOUR | ALSO ON WED 10, TUE 16 AND WED 17 APRIL | £15/£12 INCLUDES GIN SAMPLES

Join Pickering's Gin co-founder **Matt Gammell** to learn the science behind creating the perfect gin and tonic! Experience an in-depth, fast-paced distillery tour with practical demonstrations along the way. Explore the complex science of distilling and learn about alcohol properties and the different flavour-enhancing and even colour-changing components of tonic. Begin with a Pickering's gin and tonic in the Royal Dick Pub, as well as sampling the Pickering's Gin range throughout... all in the name of science, naturally! *Over 18s only.*

Presented by Summerhall Distillery

#NOFILTER: URINE TROUBLE!



WORKSHOP

SUMMERHALL | ASCUS LAB

2PM AND 6PM | 3 HOURS | £15

How does the kidney filter our blood? What role do salts and sugars in our blood play as they travel through the kidney? Chat to researchers from the University of Edinburgh about kidney health and how factors such as diet, lifestyle and age can affect kidney function, then get hands on with interactive experiments exploring this complex filtration system. *This venue is accessible by 29 steps.*

Presented by Summerhall and ASCUS Lab

THE HAPPY BRAIN



DISCUSSION

PLEASANCE | PLEASANCE THEATRE

5.30PM | 1 HOUR | £8.50/£6.50/#SCIFIVE £5

Neuroscientist and comic **Dr Dean Burnett** investigates the science of happiness, or whether such a thing even exists. What causes happiness? Is it your brain – a mere concoction of chemicals, or network of neurons? Is it in fact your gut? (Spoiler alert: yes. Sort of.) Burnett offers up a uniquely entertaining insight into what it means to be human.

Presented by Faber and Faber

WHEN THE DOGS DON'T BARK: FORENSIC SCIENCE AT WORK



DISCUSSION

NATIONAL MUSEUM OF SCOTLAND | AUDITORIUM

5.30PM | 1 HOUR | £8.50/£6.50/#SCIFIVE £5

Finding the right answers and asking the right questions is what forensic science is all about. Eminent forensic scientist **Prof Angela Gallop** reveals the advances in forensics that have influenced many of her high-profile cases, including the investigation that finally absolved the Cardiff Three, the Pembrokeshire Coastal Path murders and the killings of Stephen Lawrence, Damilola Taylor, Rachel Nickell and Roberto Calvi.

Presented by Hodder and Stoughton

FESTIVAL FRONTIERS: THE FESTIVAL CITY



DISCUSSION

PLEASANCE | LOMOND ROOM

5.30PM | 1 HOUR | £8.50/£6.50/#SCIFIVE £5

Edinburgh is known as 'the world's leading festival city' and many cities around the globe are designated or branded as festival cities through their significant provision of cultural events. This panel discussion attempts to unpack the meaning of the festival city, beyond the brand; and in doing so asks what are the physical and symbolic frontiers of a festival city in the 21st century?

Presented by Edinburgh Napier University

ACCEPT/DECLINE: KEEPING CHILDREN SAFE ONLINE



DISCUSSION

PLEASANCE | CABARET BAR

5.30PM | 90 MINS | £8.50/£6.50/#SCIFIVE £5

Twenty years ago we couldn't use a landline phone and the internet at the same time. Now we have endless internet access and with the tap of a touch screen children are exposed to it all. Join **Prof Sonia Livingstone**, children's digital rights expert and leader of the Global Kids Online project, as she discusses online safety; and head of the Developing Resilience against Online Grooming Project **Prof Nuria Lorenzo-Dus** as she and her team reveal some of the regular phrases used by online predators and demonstrate new software being developed to identify them. Hosted by Children in Scotland's **Emma Rogan**.

THE FUTURE OF FERTILITY



DISCUSSION

PLEASANCE | QUAKER STUDIO

5.30PM | 90 MINS | £8.50/£6.50/#SCIFIVE £5

It is becoming more common to have children later in life, so the need to understand human fertility is more and more important. Join experts **Dr Berna Sozen**, University of Cambridge researcher whose team published a paper on the development of artificial mouse embryos, reproductive biologist **Prof Evelyn Telfer** and **Prof Alison Murdoch**, former chair of the British Fertility Society, as they examine the challenges and breakthroughs of fertility research.

Supported by

Marks&Clerk
Intellectual Property Services

P.35

10AM–5.30PM | FOOD FOREVER
ROYAL BOTANIC GARDEN EDINBURGH

P.33

11AM–6PM | METAMORPHOSIS
SUMMERHALL

P.34

10AM–8PM | MOMENTS IN TIME
PLEASANCE

P.32

24 HOURS | A HUMAN TOUCH
THE SCOTTISH PARLIAMENT

P.35

RECURRING EVENTS

11AM–6PM | THE MIRROR TRAP
PLEASANCE

DOME NIGHTS: PLANETS 360°



DYNAMIC EARTH

6.30PM | 1 HOUR | ALSO ON WED 10, THURS 11, WED 17
AND THURS 18 APRIL | £10

Sit back and relax for a 360° immersive extravaganza. *The Planets 360°* is a re-imagining of British composer Gustav Holst's *The Planets* orchestral suite. It uses the awe-inspiring Fulldome format to create a sonically driven and immersive experience. The show aims to bring new audiences to the dome by fusing art, music and science into a 360° spectacle. Pre-recorded music by Philharmonia Orchestra. *Bar open from 6pm.*

Presented by Dynamic Earth

IN OUR HANDS: SEEDING CHANGE



SUMMERHALL | RED LECTURE THEATRE

7PM | 3 HOURS | £3

In Our Hands is the story of the farmers who, through hope, hard graft and sheer bloody-mindedness are refusing to be victims of history. This one-hour documentary takes you on a journey across the fields of Britain, past orchards of forgotten fruit and through fields of ancient grains. We explore innovations bringing back the 'culture' to 'agriculture' and the flavour to the tomato. Followed by a Q and A session and locally sourced food offerings. *This venue is undergoing access improvements, contact the venue for up-to-date information.*

Presented by Summerhall

DESIGN: THE FRONTIERS OF ART AND SCIENCE



THE PATRICK GEDDES CENTRE

7PM | 90 MINS | £8.50/£6.50

From the innovation of early man to cutting-edge design solutions, we present a swift series of short, punchy talks from a panel of academics, curators and industry experts that will guide us through the frontiers of art and science.

Presented by The Patrick Geddes Centre

HYPNOSIS, PSYCHOSIS AND THE CONSCIOUSNESS CONUNDRUM



PLEASANCE | LOMOND ROOM

8PM | 1 HOUR | £8.50/£6.50/#SCIFIVE £5

Muscle memory often refers to the autopilot-esque way in which we complete tasks and movements we have done many times before. But how does that happen? One way of discovering this comes from examining the irregularities and distortions of the mind. In an interactive session full of demonstrations, chartered psychologist **Peter Naish** will explain what we can learn about conscious awareness from mental illness and guided hypnosis.

BRING BACK THE DODO?



NATIONAL MUSEUM OF SCOTLAND | AUDITORIUM

8PM | 90 MINS | £8.50/£6.50/#SCIFIVE £5

Jurassic Park raised questions about genetic breeding, natural selection and Jeff Goldblum. Join us for a wild ride through the pop-culture of de-extinction as we explore what could be brought back and how. With clips and excerpts from films, TV and books, host **Jules Howard** will chat with **Prof Mike Bruford**, director of the Frozen Ark project, and our panel to discuss current resurrection biology research.

Supported by



LAB OF THE LUDICROUS



PLEASANCE | CABARET BAR

8PM | 90 MINS | £8.50/£6.50/#SCIFIVE £5

Stand-up scientist **Dr Rob Pyatt** returns with an all new tour of the strangest science studies ever conducted! This interactive discussion of bizarre studies will demystify scientific methods and put you at the heart of a research experiment. Expect laughter, conversation, hands-on experiments and Weird Science!

ROBIN INCE: I'M A JOKE AND SO ARE YOU



PLEASANCE | PLEASANCE THEATRE

8PM | 60 MINS | £12/£10/#SCIFIVE £5 | CC

Robin Ince, comedian and host of BBC Radio 4's *The Infinite Monkey Cage*, explores what the birth, behaviour, anxiety and storytelling of comedians may tell us about all humans. Through journeys with geneticists, neuroscientists and therapists and via brain scans, ECGs and IQ tests, Ince discusses what showing off for a living has helped him learn about what it is to be human and how best to cope with that situation.

BLAST AFF!



PLEASANCE | QUAKER STUDIO

8PM | 90 MINS | £8.50/£6.50/#SCIFIVE £5

Take a look at some of the start-ups helping make Scotland the space technology capital of Europe, and what possibilities the commercial space race is opening up. From satellites to spaceports and asteroid mining meet the engineers and researchers who are looking from Scotland to the stars.

ONGOING EXHIBITIONS

P.33	9AM-5PM CELEBRATING WOMEN IN SCIENCE ROYAL SOCIETY OF EDINBURGH
P.32	10AM-4PM CHARLES PIAZZI SMYTH 200 CALTON HILL
P.32	10AM-5PM ROBOTS EXHIBITION NATIONAL MUSEUM OF SCOTLAND

P.32	10AM-5PM MICROSCOPES: NATURE REVEALED NATIONAL MUSEUM OF SCOTLAND
P.34	10AM-5PM BUILD AND BREAK NATIONAL MUSEUM OF SCOTLAND
P.35	10AM-5.30PM FOOD FOREVER ROYAL BOTANIC GARDEN EDINBURGH

P.33	11AM-6PM METAMORPHOSIS SUMMERHALL
P.34	10AM-8PM MOMENTS IN TIME PLEASANCE
P.32	24 HOURS A HUMAN TOUCH THE SCOTTISH PARLIAMENT

FESTIVAL EVENTS

BOOKING HOTLINE: 0131 226 0005

ONLINE BOOKING: SCIENCEFESTIVAL.CO.UK

A VERY SHORT INTRODUCTION TO... DEPRESSION



PLEASANCE | CABARET BAR

1PM | 1 HOUR | **£6/#SCIFIVE £5**

Consultant psychiatrist **Dr Mary Jane Tacchi** and professor of psychological medicine **Jan Scott** present a history of depression and bipolar disorder and explain how they are experienced and understood today. They examine the controversies of diagnosis and treatment and discuss how mood disorders can influence creativity.

Presented by Oxford University Press

WHAT MAKES YOUR TICKER TICK?



SUMMERHALL | ASCUS LAB

2PM AND 6PM | 3 HOURS | **£15**

Explore what makes your ticker tick with this unique sensory and hands-on workshop. Join researchers from the University of Edinburgh to peer inside your own heart as it contracts, visualise the electrical impulses that rush through with every beat and see your own cells glow down a microscope using a fluorescence microscopy technique. Play with our science tools including ECG, ultrasound and stethoscopes and learn more about this tireless workhorse in all of us!

This venue is accessible by 29 steps.

Presented by Summerhall and ASCUS Lab

ADVANTAGE PLAY



PLEASANCE | QUAKER STUDIO

5.30PM | 1 HOUR | **£8.50/£6.50/#SCIFIVE £5**

World-renowned sports engineer **Prof Steve Haake** explores technological breakthroughs that have changed the face of sport throughout history. From novel materials to innovative methods of collecting sporting data, the one thing that might distinguish the winners from the losers is new technology.

Presented by Birlinn

GENETICS AND THE MOVIES



PLEASANCE | CABARET BAR

5.30PM | 1 HOUR | **£8.50/£6.50/#SCIFIVE £5**

What can Harry Potter teach us about inheritance? Would a clone of Arnold Schwarzenegger look, act and beat up bad guys exactly like the original? Can genetics explain how a Jedi uses the Force? Clinical molecular geneticist **Dr Rob Pyatt** explores the frontiers of genetic technology through our favourite movie trailers.

INSIDE GOOGLE TRANSLATE



PLEASANCE | LOMOND ROOM

5.30PM | 90 MINS | **£8.50/£6.50/#SCIFIVE £5**

Google Translate can interpret over one hundred human languages, but not always very well. Will it ever be able to translate poetry? Computer language expert **Adam Lopez** takes us inside the multilingual site to see how it works, with activity and discussion spanning language, creativity, and silicon brains.

Presented by The University of Edinburgh

THE EDINBURGH SEVEN



NATIONAL MUSEUM OF SCOTLAND | AUDITORIUM

5.30PM | 90 MINS | **FREE**

The Edinburgh Seven were an inspiring group of women who broke through barriers to become the first to study medicine in the UK. For the first annual Dr Elsie Inglis lecture by Edinburgh and the Lothians Health Foundation, we welcome inspirational women who are smashing through barriers. Hear tales of doctoring in the Antarctic, front-line medical treatment and surgical adventures from women pushing to the front of science history.

Supported by



THE SCIENCE OF MOUNTAINEERING



PLEASANCE | PLEASANCE THEATRE

5.30PM | 90 MINS | **£8.50/£6.50/#SCIFIVE £5**

A century ago, extreme weather conditions made mountaineering a dangerous game for the most ambitious thrill seekers. Thanks to advances in technology and medicine, even Everest has been conquered thousands of times. Alongside the Search and Rescue Aerial Association, which uses drones to aid in mountain rescue, we take a look at the modern mountaineering landscape and ask: has the edge been taken off exploration?

SCIENCE THEATRE SCRATCH NIGHT



SCOTTISH STORYTELLING CENTRE

NETHERBOW THEATRE

6.30PM | 3 HOURS | **£5**

Join us for a science theatre scratch night! This unique event is part of *Science in the Spotlight*, a project which brings together the wonder of theatre with the explosive world of science communication. Experience an exciting programme of short scratch performances, showcasing short excerpts of new works which explore a range of themes. A special evening of theatre in the making where you'll be inspired and intrigued by how science and theatre unite.

Developed with support from Creative Scotland through the Scottish Government's Festivals Expo Fund  Scottish Government Riaghaltas na h-Alba gov.scot

THE GENDERED BRAIN



NATIONAL MUSEUM OF SCOTLAND | AUDITORIUM

8PM | 1 HOUR | **£8.50/£6.50/#SCIFIVE £5**

Do you have a female or a male brain? Or is that the wrong question? Exploring centuries of sexism, neuroscientist **Prof Gina Rippon** shows how we arrived at the idea of an inferior, female brain and how cutting-edge breakthroughs in neuroscience can liberate us from this outdated understanding.

Presented by Penguin Random House

RECURRING EVENTS

P.35	11AM-6PM THE MIRROR TRAP PLEASANCE
P.42	2PM AND 4PM THE SCIENCE OF GIN AND TONIC SUMMERHALL
P.43	6.30PM DOME NIGHTS: PLANETS 360° DYNAMIC EARTH

THERE IS NO PLANET B



DISCUSSION

PLEASANCE | PLEASANCE THEATRE
8PM | 1 HOUR | **£8.50/£6.50/#SCIFIVE £5**

Humanity is exhausting its resources at an accelerated rate, but what can any of us really do about it and where do we start? Do we all need to become vegetarians? Should we frack? Or stop using air travel? Renowned sustainability expert **Prof Mike Berners-Lee** has crunched the numbers and plots a course of action to help humanity thrive on this – our only – planet. After all, *There Is No Planet B*.
Presented by Cambridge University Press

TWITTER KNOWS WHAT YOU DID LAST SUMMER



DISCUSSION

PLEASANCE | QUAKER STUDIO
8PM | 90 MINS | **£8.50/£6.50/#SCIFIVE £5**

Twitter currently has around 335 million active users. And with each user comes data. Twitter user data has been used to map public health, watch responses to natural disasters and even pre-emptively spot depressive behaviour. Our panel, including Twitter research expert **Dr Wasim Amhed** and Deputy Director of The Social Data Science Lab **Dr Luke Sloan**, takes a long hard look at social media, analysing sites live to show how much metadata is available and what it can be used for.

OUT OF REACH



DISCUSSION

PLEASANCE | LOMOND ROOM
8PM | 90 MINS | **£8.50/£6.50/#SCIFIVE £5**

While scientists, adventurers and indigeneous people have explored much of our planet, there are still places that remain difficult to reach and study. Our panel, including deep-sea biologist and author of *Ask An Ocean Explorer* **Dr Jon Copley** and 'the human swan' **Sacha Dench**, discusses some of these places that were formerly 'out of reach', what drives them to go there and what we can learn from them.

ONGOING EXHIBITIONS

P.33	9AM-5PM CELEBRATING WOMEN IN SCIENCE ROYAL SOCIETY OF EDINBURGH
P.32	10AM-4PM CHARLES PIAZZI SMYTH 200 CALTON HILL
P.32	10AM-5PM ROBOTS EXHIBITION NATIONAL MUSEUM OF SCOTLAND
P.32	10AM-5PM MICROSCOPES: NATURE REVEALED NATIONAL MUSEUM OF SCOTLAND
P.34	10AM-5PM BUILD AND BREAK NATIONAL MUSEUM OF SCOTLAND
P.35	10AM-5.30PM FOOD FOREVER ROYAL BOTANIC GARDEN EDINBURGH

DEEP TIME WALK



ACTIVITY

HOLYROOD PARK | MEET OUTSIDE DYNAMIC EARTH
10AM AND 2PM | 2 HOURS 30 MINS | ALSO ON SAT 13 AND MON 15 APRIL | **£8.50/£6.50**

Join the 4.6km *Deep Time Walk* to travel across Earth's 4.6 billion year timeline at a rate of one million years per metre. Starting at the creation of Earth, *Deep Time Walk* covers significant events in history, including the formation of the Moon, plate tectonics, the early evolution of life, dinosaurs and much more. *Please dress appropriately for this outdoor event including sensible footwear and waterproof clothing. Download the award-winning Deep Time Walk app at deeptimewalk.org.*
Presented by Edinburgh Geological Society

A VERY SHORT INTRODUCTION TO... INFINITY



ACTIVITY

PLEASANCE | CABARET BAR
1PM | 1 HOUR | **£6/#SCIFIVE £5**

Infinity is an intriguing topic, with connections to religion, philosophy, metaphysics, logic and physics as well as mathematics. Cosmologists consider sweeping questions about whether space and time are infinite. Philosophers and mathematicians have posed numerous paradoxes about infinity and infinitesimals. **Prof Ian Stewart** discusses some of the major problems and insights arising from the concept of infinity.
Presented by Oxford University Press

P.33	11AM-6PM METAMORPHOSIS SUMMERHALL
P.34	10AM-8PM MOMENTS IN TIME PLEASANCE
P.32	24 HOURS A HUMAN TOUCH THE SCOTTISH PARLIAMENT

RECURRING EVENTS

P.35	11AM-6PM THE MIRROR TRAP PLEASANCE
P.43	6.30PM DOME NIGHTS: PLANETS 360° DYNAMIC EARTH

SPOTLIGHT ON: MICROSCOPES



DISCUSSION

NATIONAL MUSEUM OF SCOTLAND | AUDITORIUM
2PM | 1 HOUR | **FREE BOOKING REQUIRED**

How has the microscope changed from the 18th century to the present day? Join curator **Julie Gibb** to examine the makers and users of an instrument that has been fundamental in improving our understanding of the natural world.
Presented by National Museums Scotland

THE UNTOLD STORIES OF WOMEN IN ENGINEERING



DISCUSSION

PLEASANCE | LOMOND ROOM
5.30PM | 1 HOUR | **£8.50/£6.50/#SCIFIVE £5**

During World War I over 800,000 women worked in engineering, however the women were expected to return to domestic duties at the end of the war. Female pioneers campaigned to retain their engineering status and in 1919 set up the Women's Engineering Society (WES). Hear engineer historian **Nina Baker** and former WES president **Dr Carol Marsh** tell the stories of these fascinating women, describing their achievements and the influence they have had on our modern world.
Presented by The Women's Engineering Society

THE SCIENCE BEHIND HUMANITY'S DARK SIDE



DISCUSSION

PLEASANCE | CABARET BAR
5.30PM | 1 HOUR | **£8.50/£6.50/#SCIFIVE £5**

Why do we think and do evil? Psychologist **Dr Julia Shaw** unlocks the intricacies of criminal psychology, drawing together science, psychology and philosophy. How similar is your brain to a psychopath's? How many people have murder fantasies? Shaw gives us insight into the evils of the world, ourselves and our Google search history.
Presented by Canongate Books

THINKING THROUGH ANIMALS



PLEASANCE | QUAKER STUDIO
5.30PM | 90 MINS | £8.50/£6.50/#SCIFIVE £5

What do we know about how animals think and about ways of explaining their behaviour? Over the last century, cognition research has revealed a variety of advanced mental abilities in animals. In this panel, experts in philosophy, genetics and anthropology discuss the frontiers of animal research in relation to human self-understanding. Could we be close to a new agreement on the relationship between us and our furred or feathered friends? Presented by The University of Edinburgh

DESIGNS FOR THE DEVELOPING WORLD



NATIONAL MUSEUM OF SCOTLAND | AUDITORIUM
5.30PM | 90 MINS | £8.50/£6.50/#SCIFIVE £5

From rural sanitation to flood defence, scientists and engineers are still finding innovative solutions for the developing world. Join experts including researcher in earthquake-resistant foundations **Dr John McDougall**, technology entrepreneur **Tim Harper** and Chief Executive of Engineers Without Borders **Katie Cresswell-Maynard**, to follow the journey of new designs from scientific concept to implementation and helping the people who need it most.

SUGAR AND SPIKES: CHANGING APPROACHES TO DIABETES CARE



ROYAL COLLEGE OF PHYSICIANS OF EDINBURGH
6PM | 90 MINS | £3

During the last 100 years, the treatment of diabetes has undergone radical transformation, with an increasing amount of self-management of the disease. Medical historian **Dr Martin Moore** explores how medical thought, patient experience and everyday practice of self-management were influenced by broader structures in British politics, culture and society. Diabetes expert **Prof Mark Strachan** continues the discussion with the latest cutting-edge research in Edinburgh. Presented by Royal College of Physicians of Edinburgh

WILD FRONTIER



ROYAL BOTANIC GARDEN EDINBURGH
LECTURE THEATRE
6PM | 1 HOUR | £5

The wild plants related to food crops are arguably the most important on the planet. They hold the genetic key to tackling the growing number of threats to our food supply and can do so in a much more environmentally friendly way. Join botanist **Dr Tiina Sarkinen** on the wild frontier of food that is bringing botanists and crop scientists together in pursuit of sustainable farming solutions based on biology rather than chemistry. Presented by Royal Botanic Garden Edinburgh

THE CITIES OF THE FUTURE



THE PATRICK GEDDES CENTRE
7PM | 90 MINS | £8.50/£6.50

The continued growth of urban populations and added pressures present sustainability challenges for our future cities. Join a panel of experts, including Planning Aid Scotland (PAS), academics, engineers and technology experts to explore what lies ahead for humanity. Presented by The Patrick Geddes Centre

BECOMING ANIMAL AND PLASTIC MAN



SUMMERHALL | RED LECTURE THEATRE
7.30PM | 90 MINS | £5

A nature film with a difference, *Becoming Animal* traces how we sense the 'more than human' world. An inspired collaboration between filmmakers **Emma Davie** and **Peter Mettler**, environmental philosopher **David Abram** journeys to Grand Teton National Park in North America to explore how the written word and technology has affected how we see. Preceded by the short film *Plastic Man* by **Yulia Kovanova**. *This venue is undergoing access improvements, contact the venue for up-to-date information.* Presented by Summerhall

TIME FOR A NEW ECONOMIC MODEL?



PLEASANCE | PLEASANCE THEATRE
8PM | 1 HOUR | £8.50/£6.50/#SCIFIVE £5

Imagine if we redesigned the economy so that it took insights from living systems. This economic model would concentrate on creating effective flows of resources and information, on regenerating the biosphere, of turning waste into food. This is the promise of a circular economy: an economic model that's restorative and regenerative by design. Discover why governments, major corporates, universities and citizen groups are all excited about a circular economy. Presented by the Ellen McArthur Foundation

GOOD FOR YOUR GUTS



PLEASANCE | UPPER HALL
8PM | 90 MINS | £12/£10 INCLUDES TASTING SAMPLES

You might have butterflies in your tummy, but is that anxious feeling actually coming from your gut? Poor mental health is one of many issues claimed to be connected to your gut. Diabetes, cancer, asthma and heart disease have all been linked too. Try some belly-busting treats as we join experts, including author of *The Psychobiotic Revolution*, **Prof John Cryan** and **Dr Helinor Johnston**, researcher in gut-nanomaterial interactions, to discover what this research is telling us and whether a better diet really cures all?

STAR WARS? THE LAW OF ARMED CONFLICT IN SPACE



PLEASANCE | LOMOND ROOM
8PM | 90 MINS | £8.50/£6.50/#SCIFIVE £5

Wars and conflict have been the cause of many dark years on Earth – but how would they affect space? Detonating bombs and using force on Earth is regulated by the law of armed conflict, but the use of weapons in space is supposedly forbidden. Get yourself into the legal mindset in this interactive event and argue the best way to regulate war in space – if at all! Presented by Edinburgh Napier University

TO BOLDLY GO:
SHORELINE OF INFINITY'S
EVENT HORIZON



PLEASANCE | CABARET BAR
8PM | 90 MINS | £8.50/£6.50/#SCIFIVE £5

Shoreline of Infinity's Event Horizon returns with a new mix of music, prose, drama, poetry and discussion. We ask whether science fiction can help us respond to the advances in science and technology and guide us to a glorious future or will it lead us to disaster and dystopia? Join in the discussion with a panel including science fiction writer **Ken MacLeod** and astrophysicist **Dr Jarita Holbrook**.

MEDICAL CANNABIS



PLEASANCE | QUAKER STUDIO
8PM | 90 MINS | £8.50/£6.50/#SCIFIVE £5

Since 2018, specialist clinicians have been able to legally prescribe cannabis-derived products to patients with an exceptional clinical need. But what does this legislation cover, what defines 'exceptional need' and are medical cannabis treatments effective? Join pharmacologist and co-founder of the International Cannabinoid Research Society **Prof Roger Pertwee**, neurologist **Prof Mike Barnes** and campaigner **Karen Gray** to look at the science behind medical cannabis and consider the benefits and the risks at play.

ARUP LECTURE: DESIGNING
A SCOTTISH ICON



NATIONAL MUSEUM OF SCOTLAND | AUDITORIUM
8PM | 90 MINS | £8.50/£6.50/#SCIFIVE £5

V&A Dundee is a building like no other. The realisation of Kengo Kuma's bold vision was achieved through the creativity and dedication of a diversely skilled team of designers, engineers and specialists. **Dan Clipsom**, project structural engineer, and **Maurizio Mucciola**, project architect, explore how our engineers and designers overcame the challenges presented by this building and to understand what makes it so special as a 'living room for the city' of Dundee.

Supported by **ARUP**

ONGOING EXHIBITIONS

P.33	9AM-5PM CELEBRATING WOMEN IN SCIENCE ROYAL SOCIETY OF EDINBURGH
P.32	10AM-4PM CHARLES PIAZZI SMYTH 200 CALTON HILL
P.32	10AM-5PM ROBOTS EXHIBITION NATIONAL MUSEUM OF SCOTLAND
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RECURRING EVENTS	
P.35	11AM-6PM THE MIRROR TRAP PLEASANCE

A VERY SHORT INTRODUCTION TO...CONSCIOUSNESS



PLEASANCE | CABARET BAR
1PM | 1 HOUR | £6/#SCIFIVE £5

Consciousness remains a hot topic. What creates our identity? Do we really have free will? Could consciousness itself be an illusion? From the construction of self in the brain to mechanisms of attention, psychologist and author **Dr Susan Blackmore** clarifies the potentially confusing arguments and outlines the amazing pace of discoveries in neuroscience.
Presented by Oxford University Press

THE MAGICIANS



PLEASANCE | PLEASANCE THEATRE
5.30PM | 1 HOUR | £8.50/£6.50/#SCIFIVE £5

In 1965, Edinburgh resident Peter Higgs predicted a new fundamental particle and almost 40 years later the Higgs particle was found at the Large Hadron Collider. This magic of science – that things predicted by mathematical formulae actually exist – is so miraculous that even scientists themselves scarcely believe it. Today, best-selling science writer **Marcus Chown** discusses the 'magicians' who have predicted the existence of invisible waves that course through the air, antimatter, black holes and more.

ARE WE TOO CLEAN?



PLEASANCE | QUAKER STUDIO
5.30PM | 90 MINS | £8.50/£6.50/#SCIFIVE £5

How clean is too clean? Host **Hana Ayoob** of *The Cloaca Monologues* joins immunologist **Dr Charu Chopra** and the rest of our panel to discuss how obsessive cleanliness might be harmful. Today they talk about the emergence of the compulsion to clean and whether we can, or should, be doing something to stop it.

FROM HANDWARMERS
TO HEATING HOMES:
COMBATING FUEL POVERTY



PLEASANCE | LOMOND ROOM
5.30PM | 90 MINS | £8.50/£6.50/#SCIFIVE £5

Highly successful academic-industrial collaboration has resulted in the development of heat batteries that reduce emissions of carbon dioxide and the levels of fuel poverty in social housing. Chaired by **Dr Siobhán Jordan** from Interface, **Prof Colin Pulham**, Head of the School of Chemistry at the University of Edinburgh and **Andrew Bissell**, CEO of Sunamp, will present their work.
Presented by The University of Edinburgh

SOUNDS OF SPACE



DISCUSSION
PLEASANCE | CABARET BAR
 5.30PM | 90 MINS | £12/£10/#SCIFIVE £5
 Chaired by science fiction sound nerd and Radio 4 space show writer and presenter **Helen Keen**, this panel explores how distant worlds and undiscovered life forms sound in the movies and in reality. Take a look at the huge contribution made by soundscapes to the science fiction genre – from classic 1950's B movies to modern day masterpieces like *Close Encounters of the Third Kind*, *Arrival* and *Under the Skin*. We'll demonstrate how uncanny sounds and new, unnerving audio is created.

SHORE: HOW WE SEE THE SEA DISCUSSION



DISCUSSION
DYNAMIC EARTH | SHOWDOME
 6PM | 2 HOURS | £5/£3
 Join us to watch two films by Scotland-based filmmakers **Margaret Salmon** and **Ed Webb-Ingall** that inspire, explore and share coastal communities' responses to Marine Protected Areas, as part of the *Shore: How We See the Sea* tour. There will be an audience discussion after the films with the filmmakers and scientists from project partner SAMS, the Scottish Association for Marine Science, followed by a celebratory reception. *Shore: How We See the Sea* is curated by Invisible Dust and supported by Creative Scotland and the Wellcome Trust.
 Presented by Dynamic Earth

EGG BY PAPER DOLL MILITIA



SHOW
SUMMERHALL | DEMONSTRATION ROOM
 7.30PM | ON UNTIL SUN 14 APRIL | 65 MINS | £14/£12
 Weaving together personal testimony, live original music and stunning aerial artistry, *EGG* takes you on a highly visual exploration of female fertility, sexuality and choice, following the true story of a woman who gave her eggs to her friend to have a child. After a sell-out Fringe run in 2018, *EGG* returns for a limited Science Festival run.
 Presented by Summerhall

THE CLOACA MONOLOGUES



DISCUSSION
PLEASANCE | PLEASANCE THEATRE
 8PM | 1 HOUR | £8.50/£6.50/#SCIFIVE £5
 Science communicator **Hana Ayoob**, zoologist **Adriana Lowe**, world fly expert **Erica McAlister** and science writer **Jules Howard** discuss one of the latest frontiers in sex – the science of vaginas. Discuss how this crucial piece of female anatomy shapes and moulds the evolution of animal mating strategies, all topped off with a 3D virtual reality tour through a duck's vagina. This Science Festival world-first is not to be missed!

DANGER OF OBSOLETION



DISCUSSION
PLEASANCE | LOMOND ROOM
 8PM | 90 MINS | £8.50/£6.50/#SCIFIVE £5
 VHS, Blu-ray and your beloved flip phone have all had their moment in the spotlight and become obsolete since. As technology advances at faster rates than ever before, experts are looking at ways to counteract the digital die-out. Join our panel of experts including specialist **Paul Capel** to explore the ideas of Cradle to Cradle® design, where the end of a product's life is considered at the design stage, and other ideas to try and reduce the estimated 1.2 million tonnes of electronic waste produced each year in the UK.

TABOOS TO BE BROKEN



DISCUSSION
PLEASANCE | CABARET BAR
 8PM | 90 MINS | £8.50/£6.50/#SCIFIVE £5
 Get under the skin and confront some of the social taboos still affecting the health and wellbeing of many. Comedian **Dave Chawner** talks about the particular challenges faced by men with eating disorders, **Dr Sharron Hinchliff** looks at sexual relationships among older generations, **Dr Kate Lister** ponders our obsession with pubic hair and **Chella Quint** busts some myths around menstruation.

SPICE OF LIFE



DISCUSSION
PLEASANCE | UPPER HALL
 8PM | 90 MINS | £12/£10 INCLUDES TASTING SAMPLES
 Could a turmeric latte be the cure for cancer? Does red wine really prevent dementia? Cancer researcher **Prof Karen Brown** and host **Dr Stuart Farrimond** will help you sort the fake claims from the real ones. Put your questions directly to those at the frontline of food science and eat and drink your way through the so-called superfoods. *Over 18s only.*

PLASTIC ALPHABET



DISCUSSION
PLEASANCE | QUAKER STUDIO
 8PM | 90 MINS | £8.50/£6.50/#SCIFIVE £5
 PP, PVC, PET: time to unwrap the language of plastics. Join us for an evening where we shed some light on the plastic mystery with the 'queen of recycling' **Prof Margaret Bates**, and polymer chemistry researcher **Prof Michael Shaver**. Led by **Colin Webster** of the Ellen MacArthur Foundation, our panel will take you on a fascinating journey from chemical processing and manufacture through to disposal, talking about how and why this material is designed, used and recycled.

ONGOING EXHIBITIONS

P.33	9AM-5PM CELEBRATING WOMEN IN SCIENCE ROYAL SOCIETY OF EDINBURGH
P.32	10AM-4PM CHARLES PIAZZI SMYTH 200 CALTON HILL
P.32	10AM-5PM ROBOTS EXHIBITION NATIONAL MUSEUM OF SCOTLAND
P.32	10AM-5PM MICROSCOPES: NATURE REVEALED NATIONAL MUSEUM OF SCOTLAND

P.34	10AM-5PM BUILD AND BREAK NATIONAL MUSEUM OF SCOTLAND
P.35	10AM-5.30PM FOOD FOREVER ROYAL BOTANIC GARDEN EDINBURGH
P.33	11AM-6PM METAMORPHOSIS SUMMERHALL
P.34	10AM-8PM MOMENTS IN TIME PLEASANCE
P.32	24 HOURS A HUMAN TOUCH THE SCOTTISH PARLIAMENT

RECURRING EVENTS

P.45	10AM AND 2PM DEEP TIME WALK HOLYROOD PARK
P.35	11AM-6PM THE MIRROR TRAP PLEASANCE
P.48	7.30PM EGG BY PAPER DOLL MILITIA SUMMERHALL

THE EVOLUTION MOTOR SHOW



CASTLE STREET

10AM-4PM | DROP-IN | FREE

Wondering how your next car will sound? Have you heard about electric cars but have no idea what they look like? Experience them first-hand for free at the *EVOLUTION Motor Show* on Castle Street. We will have the very latest in innovative plug-in and electric cars from the likes of BMW, Tesla and more. If two wheels are more your thing, we have electric scooters and even electric push-bikes. Come on down and take a ride!

Presented by PSI Ltd

THE MUSICAL BRAIN: HOW MUSIC HELPS DEMENTIA



NATIONAL MUSEUM OF SCOTLAND | AUDITORIUM

12PM | 1 HOUR | £8.50/£6.50/#SCIFIVE £5

Join *Playlist for Life* and the University of Edinburgh's Prevent Dementia project to explore how the power of music can help those with dementia. Learn how personally meaningful music – the soundtrack of your life – can restore memory, communication and connections and help to alleviate some of the stress, anxiety and isolation that comes with this condition. Visit the *Science Festival website* for more information.

Presented by The University of Edinburgh

SUMMERHALL TOURS



SUMMERHALL | MEET AT RECEPTION

2PM | 1 HOUR | ALSO ON SUN 14, FRI 19 AND SUN 21 APRIL | £5

Take a tour of Summerhall and discover its fascinating history. Did you know that one of the first known occupants of the site was a family run brewery established in the 18th century? The main iconic building we know today housed The Royal Dick School of Veterinary Studies for nearly 100 years. Visit Summerhall's labs and lecture theatres and learn about the notable alumni who contributed to science around the world. *Please note that some rooms within Summerhall are only accessible via stairs so tours will be adapted to the needs of each group.*

Presented by Summerhall

EVERYBODY HURTS



PLEASANCE | CABARET BAR

2PM | 90 MINS | £8.50/£6.50/#SCIFIVE £5

Most of us do whatever we can to avoid pain. In the UK alone we buy around 6,300 tonnes of paracetamol every year. But chronic pain, experienced by one in five people, is a major problem and can't always be treated by a pill. Grit your teeth and tackle pain head-on with our panel of experts including **Prof Lesley Colvin** looking at why we hurt and how we can treat it.

GENERATION SPACE



PLEASANCE | UPPER HALL

2PM | 90 MINS | FREE BOOKING REQUIRED

Join the Festival's **Youth Consultation Group** as we look to the frontiers we will cross in our lifetimes. We will be coming up with the science that we want to see in the world and the future that we could create through ideas and innovation in science. Get involved in finding the science of the future for Earth, space and the human race. *Recommended for ages 12-18 but all ages welcome.*

DISCOVER NEW WORLDS THROUGH CREATIVE WRITING



PLEASANCE | PENTLAND ROOM

2PM | 2 HOURS | £8.50/£6.50/#SCIFIVE £5

For those of us who are not astronauts, there is still a way for us to set foot on new moons and planets for the first time: through our writing! Join science fiction author **Oliver Langmead** and award-winning science fiction writer **Ruth EJ Booth** for a creative writing workshop filled with exciting discussion, writing and reading aloud. Be prompted by the trials and triumphs of explorers as they set foot on planets for the first time, thinking about new technologies and unforeseen hurdles that might help or hinder humanity as we explore the Universe outside our own small planet.

TRACKS AND SIGNS



PLEASANCE | OCHIL ROOM

2PM | 2 HOURS | £8.50/£6.50/#SCIFIVE £5

In the spirit of exploration we are bringing wild bushcraft to urban Edinburgh. Join our tracking expert for a fascinating workshop discovering how you can make sense of the signs all around you. Explore the hidden world of elusive animals, learn how to use all your senses and practice tracking in the city's green spaces. *Please dress appropriately for this outdoor event including sensible footwear and waterproof clothing.*

UNLOCKING THE SECRETS OF OUR PAST



NATIONAL MUSEUM OF SCOTLAND | AUDITORIUM

3PM | 1 HOUR | FREE BOOKING REQUIRED

Discuss and explore how science, technology and innovation in archaeology are used to unlock secrets of the past, with the Society of Antiquaries of Scotland's Fellows **Dr Lisa Brown** and **Dr Alison Sheridan**, chaired by science author and broadcaster **Prof Jim Al-Khalili**.

Presented by The Society of Antiquaries Scotland

Image: Historic Environment Scotland

SUNFALL WITH JIM AL-KHALILI



PLEASANCE | PLEASANCE THEATRE
5.30PM | 1 HOUR | £12/£10/#SCIFIVE £5

Join eminent physicist and broadcaster **Prof Jim Al-Khalili** in conversation with novelist **Lin Anderson** for an enlightened discussion about his debut novel, *Sunfall*. Depicting a world under attack from rampant climate change, uncontrollable mass migration and cyber-terrorism, Al-Khalili details the fact and fiction behind this nail-biting story. Presented by Penguin Random House

DESIGNED BY NATURE



PLEASANCE | LOMOND ROOM
5.30PM | 90 MINS | £8.50/£6.50/#SCIFIVE £5

The natural world has influenced technology for years. Velcro came from sticky burdock seeds, while high-speed bullet trains might not exist without the kingfisher's streamlined beak. **Dr Kathryn Harkup** hosts as biomechanics researcher **Dr Naomi Nakayama** and founder of Biomimicry UK **Richard James MacCowan** explore the world of biomimetics, where engineering is inspired by the world around us.

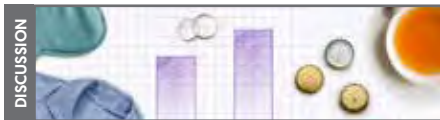
HEALTH TRACKERS: HELP OR HINDRANCE?



PLEASANCE | QUAKER STUDIO
5.30PM | 90 MINS | £8.50/£6.50/#SCIFIVE £5

As we settle into the digital age, increasing numbers of people are turning to fitness trackers to tell them about their activity and give nudges to help improve their health. Trackers collect a huge amount of data on us, from our date of birth to our daily movements. Today we ask: could the data be used to improve human health, or is it just a privacy and security risk? Panelists include **Beverley Bryant**, former director of digital technology for NHS England, **Dr Lukasz Piwek**, researcher in smart wearables' data, and **Dr Paul Patras**, lecturer in cyber security. Hosted by fitness writer **Nick Harris-Fry**.

BRITAIN IS A NATION OF...



PLEASANCE | CABARET BAR
5.30PM | 90 MINS | £8.50/£6.50/#SCIFIVE £5

Just how wide is the gap between the scientific community and the British public? Join us for a live recording of the Yahoo & YouGov data podcast, *Britain is a Nation of...*, hosted by **Stuart Henderson**, head of news at Yahoo UK, **Matilda Long**, news editor at Yahoo and **Victoria Waldersee**, data journalist at YouGov. They'll be discussing new YouGov survey results that explore trust, understanding, and curiosity around all things science.

A SCIENCE SKEPTACULAR!



FRANKENSTEIN | BIER KELLER
7.30PM | 2 HOURS | FREE DONATIONS WELCOME

Join the Edinburgh Skeptics Society for an evening of science, music, magic, skepticism and comedy to entertain and make you think. Marvel at magician **Dave Alnwick**, and guffaw with laughter with stand-up comedian and archaeologist, **Paul Duncan McGarrity**. Add to the mix comedian and skeptic, **Carmen D'Cruz** alongside research scientist, **Dr Alice Howarth** and you've got an entertaining and informative Saturday-Night Science Skeptacular! *Over 18s only*. Presented by Edinburgh Skeptics

UNNATURAL SELECTION



PLEASANCE | CABARET BAR
8PM | 1 HOUR | £8.50/£6.50/#SCIFIVE £5

Fusing together art, science and history, author and illustrator **Katrina van Grouw** explores selective breeding – the ongoing transformation of animals at the hand of man. Accompanied by her stunning illustrations, van Grouw discusses the evolutionary forces that have shaped wild and domesticated animals alike, paying tribute to the 150th anniversary of Charles Darwin's *The Variation of Animals and Plants under Domestication*. Presented by Princeton University Press
Image: Katrina van Grouw

EMERGENCY ON THE ISS



PLEASANCE | LOMOND ROOM
8PM | 90 MINS | £8.50/£6.50/#SCIFIVE £5

The International Space Station (ISS) has sprung a leak – what happens now? It's scary to think what might go wrong in space but for people working on the ISS it can be a reality. Join Radio 4's **Helen Keen** in discussing rocket launches and helmets that collect water while on spacewalks with our panel, including space medicine expert **Dr Christina Mackaill**. Disaster can happen, so how do you prepare for the worst?

ON THE FRONTIERS OF SANITY



PLEASANCE | PLEASANCE THEATRE
8PM | 90 MINS | £8.50/£6.50/#SCIFIVE £5

Mental health professionals have raised questions about Donald Trump's mental health but how do we decide, when simply observing a person's behaviour and their speech, whether they are sane or not? In this fun audience experiment psychologist **Rebecca McGuire-Snieckus** and psychiatrist **Dr Raj Persaud** will test how the public make decisions about a politician's mental health by using Donald Trump's notorious Twitter feed. And if you want to know what the diagnosis is for the most bizarre personal or public behaviour... just ask the experts!

AN EVENING WITH THE MOON



PLEASANCE | UPPER HALL
8PM | 2 HOURS | £12/£10 INCLUDES WELCOME COCKTAIL

Discuss your favourite Moon moments to the backdrop of a lunar landscape. Be enchanted by our wondrous Moon in an evening of laid-back lunar activities and celestial cocktails whilst listening to experts in anthropology and popular culture, including popular science writer **Philip Ball**, and cultural astronomer **Daniel Brown**, hosted by comedian **Susan Morrison**. *Over 18s only*.

ONGOING EXHIBITIONS

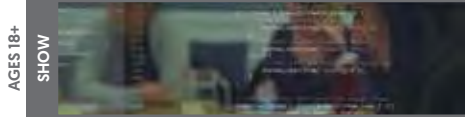
P.33	9AM-5PM CELEBRATING WOMEN IN SCIENCE ROYAL SOCIETY OF EDINBURGH
P.32	10AM-4PM CHARLES PIAZZI SMYTH 200 CALTON HILL
P.32	10AM-5PM ROBOTS EXHIBITION NATIONAL MUSEUM OF SCOTLAND
P.32	10AM-5PM MICROSCOPES: NATURE REVEALED NATIONAL MUSEUM OF SCOTLAND

P.34	10AM-5PM BUILD AND BREAK NATIONAL MUSEUM OF SCOTLAND
P.35	10AM-5.30PM FOOD FOREVER ROYAL BOTANIC GARDEN EDINBURGH
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P.34	10AM-8PM MOMENTS IN TIME PLEASANCE
P.32	24 HOURS A HUMAN TOUCH THE SCOTTISH PARLIAMENT

RECURRING EVENTS

P.35	11AM-6PM THE MIRROR TRAP PLEASANCE
P.49	2PM SUMMERHALL TOURS SUMMERHALL
P.48	7.30PM EGG BY PAPER DOLL MILITIA SUMMERHALL

THE JUSTICE SYNDICATE



PLEASANCE | OCHIL ROOM
11AM, 2PM AND 5PM | 2 HOURS
£8.50/£6.50/#SCIFIVE £5

A top surgeon is accused of a serious crime. Conviction would mean planned operations will not go ahead and the evidence is far from conclusive. Listen to the evidence and make your decision: how will you vote? The Justice Syndicate is a piece of playable theatre putting you in the jury box. *Please note this performance contains both discussion of sexual assault and explicit description of consensual sexual activity. Over 18s only.*
Presented by fanSHEN

EXO-ELEMENTS



PLEASANCE | QUAKER STUDIO
3PM | 60 MINS | £8.50/£6.50/#SCIFIVE £5

The discovery of exoplanets outside our solar system has sparked discussion regarding what we know about planetary systems. In this event **Dr Beth Biller** of the University of Edinburgh's Institute for Astronomy, investigates the clouds and chemical compositions of exoplanets and will discuss the possibility of eventually finding signs of life on planets outside of our own solar system.



HOW MANY IS TOO MANY?



NATIONAL MUSEUM OF SCOTLAND | AUDITORIUM
3PM | 90 MINS | £8.50/£6.50/#SCIFIVE £5

Forget climate change, is human overpopulation the biggest threat to the planet? According to Global Footprint Network, a sustainable population for our planet is between 1.5 and 3 billion people, but we are estimated to reach 9.7 billion by 2050. Our experts, including Director of Population Matters **Robin Maynard**, human rights researcher and population ethicist **Karin Kuhlemann** and population statistician **Dr Alan Marshall** discuss what the future might look like.

FUTURE POLITICS



NATIONAL MUSEUM OF SCOTLAND | AUDITORIUM
12PM | 1 HOUR | £8.50/£6.50/#SCIFIVE £5

Author and practising barrister **Jamie Susskind** confronts one of the most important questions of our time: how will digital technology transform politics and society? How far should our lives be directed and controlled by powerful digital systems and on what terms? In conversation with digital democracy expert **Emma Mulqueeny**, Susskind challenges us to rethink what it means to be free or equal and proposes ways in which we can and must regain control.
Presented by Oxford University Press

THE SCIENCE OF BAKING



PLEASANCE | UPPER HALL
3PM | 90 MINS | £8.50/£6.50/#SCIFIVE £5

Baking is rapidly becoming one of our nation's favourite (and tastiest) pastimes. Producing beautiful breads and cute cupcakes is rightfully seen as a creative endeavour but it is just as much a science as it is an artform. We explore the scientific methods and principles to make the perfect pastry or the lightest sponge cake.

BLUEPRINT: HOW DNA MAKES US WHO WE ARE



PLEASANCE | QUAKER STUDIO
5.30PM | 1 HOUR | £8.50/£6.50/#SCIFIVE £5

Psychologist **Prof Robert Plomin** shows the extent to which our genes, personality and physicality are shaped from birth. Looking at the predictive abilities of DNA, Plomin reveals why even nurture is actually nature. With gene testing kits now available online and in the home, it's time to talk about the DNA revolution.
Presented by Penguin Random House

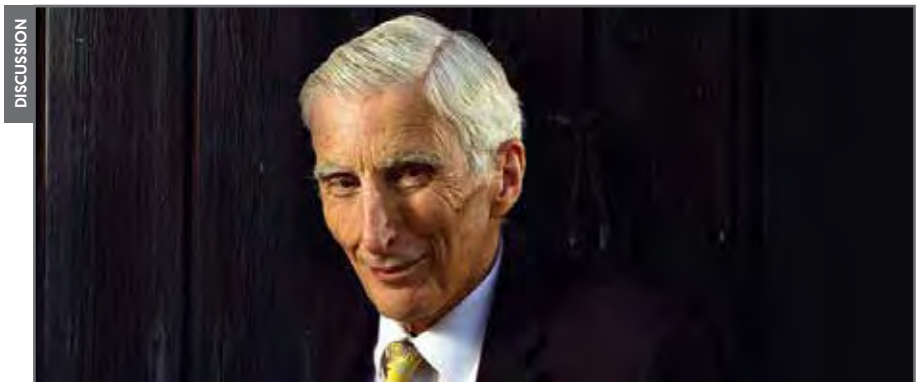
DINNER WITH DARWIN



ROYAL BOTANIC GARDEN EDINBURGH
LECTURE THEATRE
2PM | 1 HOUR | £5

Our primate ancestors were vegans and our closest relatives, the great apes, have a largely vegetarian diet. So why have humans moved away from living on a diet of plants alone? How did evolution change our eating habits and why do we now cook our food? Evolutionary ecologist **Prof Jonathan Silvertown** provides the answers to these and other digestive puzzles.
Presented by Royal Botanic Garden Edinburgh

ON THE FUTURE: PROSPECTS FOR HUMANITY



PLEASANCE | PLEASANCE THEATRE
5.30PM | 1 HOUR | £12/£10/#SCIFIVE £5 | CC

What will the world look like in 2050? Does science still do more good than harm? Will we build new worlds in space? Astronomer Royal **Lord Martin Rees** explores some of the themes of his recent book, *On the Future: Prospects for Humanity*. How can we survive the risks inherent to advances in science and technology and thrive? Lord Rees calls on all of us to join the debate on how to determine a positive vision for humanity, on Earth and beyond.
Presented by Princeton University Press

TREATING PATIENTS AS PEOPLE IN THE NHS



PLEASANCE | LOMOND ROOM
5.30PM | 90 MINS | **£8.50/£6.50/#SCIFIVE £5**

Whether you've experienced the service first hand or you know a loved one who has, the NHS has touched the lives of millions. Yet a flurry of conversation continues to surround the healthcare service with some questioning whether it is fit for purpose. Does the NHS place enough focus on the individual? Throughout this lively debate you will use an electronic voting system to contribute your own views to the discussion.

Presented by Edinburgh Napier University

ENDOMETRIOSIS: THE BLOODY TRUTH



PLEASANCE | CABARET BAR
5.30PM | 90 MINS | **£8.50/£6.50/#SCIFIVE £5**

Endometriosis is an incurable disorder that can take years to diagnose and can cause distressing symptoms like chronic pain and infertility. Join this roundtable discussion and extensive Q and A to raise awareness of the condition and the work being done to support patients, improve treatment within the NHS and find new, innovative ways of treating symptoms without multiple surgeries or drugs.

Presented by The University of Edinburgh and Endometriosis UK

TAM DALYELL PRIZE LECTURE



PLAYFAIR LIBRARY
6PM | 90 MINS | **FREE BOOKING REQUIRED**

The Tam Dalyell Prize for Excellence in Engaging the Public with Science recognises and rewards the University of Edinburgh's outstanding science communicators. This year's prize is awarded to **Dr Steve Brusatte**, Reader in Vertebrate Palaeontology. His research is often profiled in popular press and he is a resident palaeontologist and consultant for the BBC's *Walking With Dinosaurs*. Today, Dr Brusatte and his team will share highlights of their dinosaur research.

Presented by The University of Edinburgh

SHOOT FOR THE MOON



PLEASANCE | PLEASANCE THEATRE
8PM | 1 HOUR | **£12/£10**

In celebration of the 50th anniversary of the Apollo 11 Moon landing, join psychologist and author **Prof Richard Wiseman** in conversation with comedian and broadcaster **Helen Keen** to investigate the powerful life lessons behind humanity's greatest achievement. The result of intensive research including interviews with surviving members of the Apollo mission control, today Wiseman uncovers key lessons on teamwork, leadership, persistence, creativity and more, each one a vital part of the mindset for success.

DIGITAL THERAPIST



PLEASANCE | LOMOND ROOM
8PM | 90 MINS | **£8.50/£6.50/#SCIFIVE £5**

Could virtual reality treat depression or could a robot companion make you feel better? Our panel, including leading clinical psychologist **Prof Daniel Freeman**, robotics expert **Prof Ruth Aylett** and co-developer of the NHS Digital approved *Feeling Good: positive mindset* app **Dr Sheila Ross**, explores some of the beneficial effects of technology and how it could be used to help improve our mental health.

BORROWED TIME



PLEASANCE | CABARET BAR
8PM | 1 HOUR | **£8.50/£6.50/#SCIFIVE £5**

The biggest single risk factor for the diseases of old age is the ageing process itself. Now geroscience (the science of aging) is uncovering common mechanisms that can be manipulated to prevent or delay a host of these crippling conditions to allow us to remain healthy, active and independent deep into old age. Join us in exploring the prospects with **Richard Faragher**, professor of biogerontology and **Sue Armstrong**, author of *Borrowed Time*. Presented by Bloomsbury Publishing

PLANETS AND PULSATIONS: THE KEPLER AND TESS SPACE MISSIONS



PLEASANCE | QUAKER STUDIO
8PM | 1 HOUR | **£8.50/£6.50/#SCIFIVE £5**

One of the biggest questions humans can ask is, 'are we alone?' While we can't answer that just yet, we are closer than ever before thanks to technological advances. In this discussion about the new research field of Asteroseismology, learn how the Kepler Space Mission found more than 4,000 planets orbiting stars and how the Transiting Exoplanet Survey Satellite (TESS) explores exoplanets close to Earth.

DINE AND DEBATE



PLEASANCE | UPPER HALL
8PM | 2 HOURS | **£30 INCLUDES THREE-COURSE MEAL**

In the spirit of the original Oyster Club founded by Adam Smith, Joseph Black and James Hutton, we invite you to discuss some of our most pressing scientific quandaries over supper. Hosted by comedian **Susan Morrison** with short presentations from experts and a delicious three course meal, you'll be encouraged to chat about the topics raised around your table - with a little help from our facilitators. No knowledge required - just an appetite for discussion and appreciation of good food and drink. *Over 18s only.*

MONDAY 15 APRIL

ONGOING EXHIBITIONS

P.33	9AM-5PM CELEBRATING WOMEN IN SCIENCE ROYAL SOCIETY OF EDINBURGH	P.35	10AM-5.30PM FOOD FOREVER ROYAL BOTANIC GARDEN EDINBURGH
P.32	10AM-4PM CHARLES PIAZZI SMYTH 200 CALTON HILL	P.33	11AM-6PM METAMORPHOSIS SUMMERHALL
P.32	10AM-5PM ROBOTS EXHIBITION NATIONAL MUSEUM OF SCOTLAND	P.32	24 HOURS A HUMAN TOUCH THE SCOTTISH PARLIAMENT
P.32	10AM-5PM MICROSCOPES: NATURE REVEALED NATIONAL MUSEUM OF SCOTLAND		RECURRING EVENTS
P.34	10AM-5PM BUILD AND BREAK NATIONAL MUSEUM OF SCOTLAND	P.45	10AM AND 2PM DEEP TIME WALK HOLYROOD PARK

TUESDAY 16 APRIL

ONGOING EXHIBITIONS

P.33	9AM-5PM CELEBRATING WOMEN IN SCIENCE ROYAL SOCIETY OF EDINBURGH	P.35	10AM-5.30PM FOOD FOREVER ROYAL BOTANIC GARDEN EDINBURGH
P.32	10AM-4PM CHARLES PIAZZI SMYTH 200 CALTON HILL	P.33	11AM-6PM METAMORPHOSIS SUMMERHALL
P.32	10AM-5PM ROBOTS EXHIBITION NATIONAL MUSEUM OF SCOTLAND	P.32	24 HOURS A HUMAN TOUCH THE SCOTTISH PARLIAMENT
P.32	10AM-5PM MICROSCOPES: NATURE REVEALED NATIONAL MUSEUM OF SCOTLAND		RECURRING EVENTS
P.34	10AM-5PM BUILD AND BREAK NATIONAL MUSEUM OF SCOTLAND	P.42	2PM AND 4PM THE SCIENCE OF GIN AND TONIC SUMMERHALL



YOUTH CONSULTATION GROUP

We are back for another year. Building on the success of our involvement with the Edinburgh Science Festival in 2018, we are going above and beyond for our 2019 theme: *Frontiers*.

We've been working on ideas and making decisions that will help the Festival connect with people our age, and assisting in the creative development of future Edinburgh Science Festival activities.

We love coming up with new ideas and fresh perspectives to produce an inclusive and diverse programme of events that can inspire audiences of 12-18 years old.

Check out our special event *Generation Space* (p.49) to hear the changes we want to see in the world and the science, technology, engineering and mathematics that we think will get us there.

Look out for more information and recommended events at sciencefestival.co.uk/youth-consultation-group and on social media.



BEING A WOMAN IN SCIENCE: CHANGED TIMES?



THE ROYAL SOCIETY OF EDINBURGH

WOLFSON LECTURE THEATRE
6PM | 90 MINS | FREE BOOKING REQUIRED

When so many female scientists have changed our understanding of the world and yet around half the UK population struggles to name a woman in science, questions need to be asked! What attracts women to science, what are their experiences and why are they not more visible? Join us for a fascinating discussion with current and former Royal Society of Edinburgh (RSE) Presidents, **Prof Dame Anne Glover** and **Prof Dame Jocelyn Bell Burnell** and RSE Young Academy of Scotland member **Dr Silvia Paracchini** as they discuss their personal experiences of being women in science.

Presented by The Royal Society of Edinburgh

COMMUNICATING THE HIDDEN COMMONS



DYNAMIC EARTH | BIOSPHERE

6.30PM | 90 MINS | £8/£5
BBC's *The Power of the Planet* presenter **Prof Iain Stewart** explores the challenges of understanding the underground. The geological subsurface represents one of Earth's major commons and is a natural resource base for much of the human economy. Hear about the challenges we face in understanding the realm below our feet and managing it more sustainably.

Presented by Dynamic Earth and British Geological Survey

THE FUTURE IS ROBOT



NATIONAL MUSEUM OF SCOTLAND | AUDITORIUM

8PM | 90 MINS | £8.50/£6.50/#SCIFIVE £5

What role will robots play in our lives? Join writer, broadcaster and comedian **Timandra Harkness** to examine how design and programming decisions made today will affect our relationships with robots in the future.

Presented by National Museums Scotland

GASTROFEST

A smorgasbord of insightful discussions, delicious dining experiences and special science-themed presentations, *GastroFest* is the treat to suit all tastes.

A mini festival of the science of food and drink, *GastroFest* showcases the importance of science in our lives in the most delicious way possible: through a series of innovative events exploring the centrality of science to our culinary experience with snacks included!

Cheese lovers unite for the return of *Cheeseology 4.0* (p.37), a tutored tasting and flavour explosion; indulge your tastebuds and learn of some spectacular superfoods in *Spice of Life* (p.48); or create the perfect pastry and light sponge with our *The Science of Baking* (p.51) special event.

If you're still hungry it may be time to discover the *Secrets of Seafood* (p.39) or find some answers while you fill your belly at *Dine and Debate* (p.52).

And once you're feeling full and that tummy starts to grumble, find out what's actually *Good for your Guts* (p.46) before you eat anything else!



WEDNESDAY 17 APRIL

ONGOING EXHIBITIONS

P.33	9AM-5PM CELEBRATING WOMEN IN SCIENCE ROYAL SOCIETY OF EDINBURGH
P.32	10AM-4PM CHARLES PIAZZI SMYTH 200 CALTON HILL
P.32	10AM-5PM ROBOTS EXHIBITION NATIONAL MUSEUM OF SCOTLAND
P.32	10AM-5PM MICROSCOPES: NATURE REVEALED NATIONAL MUSEUM OF SCOTLAND
P.34	10AM-5PM BUILD AND BREAK NATIONAL MUSEUM OF SCOTLAND

P.35	10AM-5.30PM FOOD FOREVER ROYAL BOTANIC GARDEN EDINBURGH
P.33	11AM-6PM METAMORPHOSIS SUMMERHALL
P.32	24 HOURS A HUMAN TOUCH THE SCOTTISH PARLIAMENT

RECURRING EVENTS

P.42	2PM AND 4PM THE SCIENCE OF GIN AND TONIC SUMMERHALL
P.43	6.30PM DOME NIGHTS: PLANETS 360° DYNAMIC EARTH

THE HEART OF THE BRAIN



NATIONAL MUSEUM OF SCOTLAND | AUDITORIUM
5.30PM | 1 HOUR | £8.50/£6.50/#SCIFIVE £5

How much of what we do is really governed by reason? Renowned neuroscientist **Prof Gareth Leng** considers the extent to which one small structure of the neuroendocrine brain, the hypothalamus, influences what we do, how we love and who we are. Discover how the brain is very much at the heart of what makes us human.
Presented by MIT Press

ANGELA MELITOPOULOS: RESEARCHER IN RESIDENCE



COLLECTIVE | CALTON HILL
5.30PM | 90 MINS | £5/£4

Join us to investigate lenses: instruments that correct and expand the frontiers of vision, focus light to form images and (re)produce our perception of the world around us. Collective's 2019 researcher-in-resident, artist and filmmaker **Angela Melitopoulos** will explore the complex relationships between vision and understanding, perception and memory in this public lecture.
Presented by Collective

THE FUTURE OF CYBER SECURITY, DATA AND AI



NATIONAL MUSEUM OF SCOTLAND | AUDITORIUM
8PM | 1 HOUR | £8.50/£6.50/#SCIFIVE £5

Hosted by leading technologist, **Sharon Moore**, cyber expert **Prof Bill Buchanan** discusses the frontiers of Artificial Intelligence. Our world is changing fast and we are moving into an information age. Unfortunately, many of our systems can not be trusted and our new world provides increased threats against our privacy. This presentation will explore the risks we face and the new opportunities that this information age will bring.

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GASTROFEST



FESTIVAL FRONTIERS

TAKE A TRIP DOWN
TO FLAVOUR TOWN

ONGOING EXHIBITIONS

P.33	9AM-5PM CELEBRATING WOMEN IN SCIENCE ROYAL SOCIETY OF EDINBURGH
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P.32	24 HOURS A HUMAN TOUCH THE SCOTTISH PARLIAMENT
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RECURRING EVENTS

P.45	6.30PM DOME NIGHTS: PLANETS 360° DYNAMIC EARTH
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NATURAL SCIENCES COLLECTION TOUR



NATIONAL MUSEUMS COLLECTION CENTRE

10.30AM | 75 MINS | £7/£6/£5

From minuscule insects to mighty whales, the National Museums' Natural Sciences collection documents the incredible diversity of life on Earth. Join curators and conservators to tour selected highlights of this remarkable collection.

Presented by National Museums Scotland

LAUNCHING ST KILDA'S SECRETS



NATIONAL MUSEUM OF SCOTLAND | AUDITORIUM

11AM | 1 HOUR | FREE BOOKING REQUIRED

Witness the launch of a digital version of *Hirta*, a remote island one hundred miles north-west of Scotland. On World Heritage Day, experience life on the largest island in the St Kilda archipelago and learn how this Minecraft map was developed. Explore its environment from the Bronze Age to the twentieth century through a new resource that combines heritage, Minecraft and learning in this Science Festival first.

Presented by The Society of Antiquaries Scotland and Immersive Minds

THE MOTOR NEURONE DISEASE RESEARCH REVOLUTION



NATIONAL MUSEUM OF SCOTLAND | AUDITORIUM

5.30PM | 90 MINS | £8.50/£6.50/#SCIFIVE £5

Motor Neurone Disease (MND) is a rapidly progressing terminal neurological illness with an average life expectancy of 20 months from diagnosis. MND has no cure and it can affect anyone at any time. Scotland is leading a research revolution and today charity MND Scotland and researchers at The University of Edinburgh join us to discuss research into MND and showcase how an innovative digital platform allows for collaboration between scientists and patients.

Presented by MND Scotland

ART AND SCIENCE OF THE MIND



URBANE ART GALLERY

6PM | 90 MINS | FREE BOOKING REQUIRED

Join psychologist **Dr Dhanraj Vishwanath** to discover the links between cognitive science and art. With a background in architecture, design and cognitive science, Vishwanath explores cognitive neuroscience research that unpicks complex mental processes underlying the creation and appreciation of art.

Presented by Urbane Art Gallery

SOURCING HEALTHY FOOD AS THE WORLD CHANGES



ROYAL BOTANIC GARDEN EDINBURGH

LECTURE THEATRE

6PM | 1 HOUR | FREE BOOKING REQUIRED

Global demand for food continues to grow and we are more concerned than ever that food should be safe and nutritious. Climate change predictions highlight serious challenges for future food production, but in the meantime agriculture makes a significant contribution to greenhouse gas emissions. Lancaster University's **Prof Bill Davies** explores the hard decisions we need to make and how plant science provides opportunities to create the kind of world we want to live in.

Presented by Royal Botanic Garden Edinburgh

THE TRUTH ABOUT FAT



NATIONAL MUSEUM OF SCOTLAND | AUDITORIUM

8PM | 1 HOUR | £8.50/£6.50/#SCIFIVE £5

We are getting fat and sick in increasing numbers and it's placing a devastating burden on our healthcare systems. Scientists are desperate to explain this epidemic and stave off a modern health disaster. But what's to blame? **Anthony Warner**, aka *The Angry Chef*, scrutinises the explanations of experts and considers whether we are blaming our own bodies for other people's ignorance and cruelty.

Presented by OneWorld Publications

ARE YOU PASSIONATE ABOUT SCIENCE COMMUNICATION?

Edinburgh Science Festival is launching a brand new delegate programme for science engagement professionals, teachers, youth workers, academics and creatives.

Meet with Festival staff, speakers and experts to learn more about the ways in which – through hands-on science, exhibitions, theatre, comedy, song and art – we collectively create and deliver the original, and one of the world's largest, Science Festivals.

The delegate programme runs from **Monday 8-Thursday 11 April**
Find out more: sciencefestival.co.uk/delegates



ONGOING EXHIBITIONS

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P.32	24 HOURS A HUMAN TOUCH THE SCOTTISH PARLIAMENT

RECURRING EVENTS

P.49	2PM SUMMERHALL TOURS SUMMERHALL
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THE SCIENCE OF EGYPTIAN MUMMIFICATION: A NO-BRAINER?



NATIONAL MUSEUM OF SCOTLAND | AUDITORIUM
5.30PM | 90 MINS | **£8.50/£6.50/#SCIFIVE £5**
Dr Stephen Buckley of York University's Mummy Research Group explores the latest ground-breaking research on how the ancient Egyptians dealt with death by challenging the misunderstandings which have clouded much of our knowledge and understanding of Egyptian mummification.

THE STORY OF HOW WE BECAME US



NATIONAL MUSEUM OF SCOTLAND | AUDITORIUM
8PM | 90 MINS | **£8.50/£6.50/#SCIFIVE £5**
Things that were once thought to be unique human behaviour are being discovered in the animal kingdom. From tools and fashions to fire and art – what does it mean to be human when animals can do it too? How special are we really? This conundrum – that our biology is indistinct from all other life, yet we consider ourselves unique – is the central question of the human condition. Join geneticist, author and BBC Radio 4 *Inside Science* broadcaster **Dr Adam Rutherford** to explore this quandary.

ONGOING EXHIBITIONS

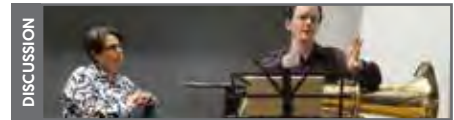
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P.32	24 HOURS A HUMAN TOUCH THE SCOTTISH PARLIAMENT

A LAKESIDE VIEW ON MARS



NATIONAL MUSEUM OF SCOTLAND | AUDITORIUM
12PM | 90 MINS | **£8.50/£6.50/#SCIFIVE £5**
On Earth, wherever we find water we find life. But is this true on other planets? Tiny blips in scanning the surface of Mars have led to the discovery of a liquid lake under the ice cap. Delve under the surface to discover what water on Mars really means with planetary science expert **Dr Lydia Hallis** and **Dr Jon Wade**, the University of Oxford's planetary formation researcher.

AN AFTERNOON OF MUSIC AND MATHEMATICS



NATIONAL MUSEUM OF SCOTLAND | AUDITORIUM
3PM | 1 HOUR | **£8.50/£6.50/#SCIFIVE £5**
Hear a tuba playing music inspired by maths and find out how three amazing collaborators work together to create a mathematical auditory sensation. **Lasse Rempe-Gillen** works in the area of dynamical systems and **Jack Adler-McKean** works primarily as a tubist, promoting his instrument to the contemporary musical world. **Emily Howard**'s music is known for its particular connection with science and mathematics and she discusses her compositions via a film contribution.
Presented by International Centre for Mathematical Sciences

ONE SMALL TWEET FOR MAN, ONE GIANT LEAP FOR MOVIE-KIND.

SCOTTISH SCIENTISTS' TWEET PITCH 2019!

XpoNorth is teaming up with the Edinburgh Science Festival to boldly go where no one has gone before... and host a Scientists' Tweet Pitch!

On Friday 19th April Scientists from across Scotland can tweet pitch a Film, TV or Game idea to the XpoNorth network of International screen producers and agents: if they like what they see they'll be in touch!

9AM - 9PM | Friday 19th April 2019

COMPOSE A TWEET IN 280 CHARACTERS OR LESS & TWEET USING THE HASHTAG: **#XPONORTH**



In partnership with the Edinburgh Science Festival
www.edinburghscience.co.uk @EdSciFest

ONGOING EXHIBITIONS

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RECURRING EVENTS

P.49	2PM SUMMERHALL TOURS SUMMERHALL
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APPLE OF MY EYE



DISCUSSION

ROYAL BOTANIC GARDEN EDINBURGH

LECTURE THEATRE

2PM | 1 HOUR | £5

Sometimes loving something can have unintended consequences. Threats to the Scottish wildcat through crossbreeding with domestic moggies have been a concern for years, but wild plants face the same problems. Our love of apples could be pushing one of Scotland's rarest native trees towards extinction. Geneticist **Dr Markus Ruhsam** explores the genetics of one of our most popular healthy snacks – the apple – and shares evidence that it poses a threat to the native crab apple.

Presented by Royal Botanic Garden Edinburgh

HOW SMART ARE SMART DEVICES?



DISCUSSION

NATIONAL MUSEUM OF SCOTLAND | AUDITORIUM

3PM | 90 MINS | £8.50/£6.50/#SCIFIVE £5

Each day we add more smart devices to our lives from doorbell cameras linked to apps, online fridges ordering food and smart watches telling us when to exercise. Join panellists including **Dr Nick Taylor**, specialist in human-computer interactions, to explore what a smart device is, what data they are collecting and how your devices could be used against you, with a simulated attack included.

BOOKING INFORMATION

Book online sciencefestival.co.uk

If you experience any issues while attempting to make an online booking, please email the Box Office at boxoffice@scifest.co.uk.

Book by phone 0131 226 0005

Wednesday 13 February–Friday 29 March: 10.30am–5.30pm (Mon–Fri)
Saturday 30 March–Sunday 16 April: 8.30am–6pm (Mon–Sat), 11am–4pm (Sun)

Book in person
Edinburgh Festival Fringe Shop
180 High Street, Edinburgh, EH1 1QS
10.30am–5.30pm (Monday–Friday)
If tickets for your desired event are available, they can also be purchased at the venue 30 minutes prior to the start time.

Group discounts

We welcome groups to the Festival and discounts may be available depending on the event and the size of the party. Please call the Box Office on **0131 226 0005** to discuss your needs.

Babes in arms

Children under three years old do not require a ticket for events, except if the event is specifically for children under three years old.

Concessions

Unless otherwise stated, concessions are available to pensioners, the unemployed and disabled persons, with a complimentary ticket available for carers, which can be booked by phone or in person at our Box Office.

Students and teachers can access #scifive £5 tickets for most of our events. More information on p.37.

For all concession tickets, proof of status may be required.

Refunds

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

ACCESSIBILITY

If you would like a copy of this brochure in a different format, please contact marketing@scifest.co.uk or call **0131 553 0320**. Access information is available at the front of this brochure (p.6–7) and at sciencefestival.co.uk/venues. We have a selection of accessible events and services too (p.16).

If you have specific access requirements or need to book wheelchair space, please call the Box Office on **0131 226 0005**.

FILMING AND PHOTOGRAPHY

Filming and photography will take place at many Science Festival events and may be used for promotional purposes. If you have any concerns, please speak to a member of staff at the event.

GETTING TO THE SCIENCE FESTIVAL

Many of our venues are in the city centre and easily accessible on foot or by public transport. Please be aware of the environment when planning your travel to and from our events.

By bus

Visit lothianbuses.co.uk or call **0131 555 6363** for bus route information.

By train

ScotRail and National Rail Enquiries provide train company promotions, train times and fare information. scotrail.co.uk or nationalrail.co.uk.

By bike

Plan routes through the city at edinburgh.cyclestreets.net. With edinburghcyclehire.com hire points across the city, you don't even need your own bike.

By car

There are multi-storey car parks and metered parking around the city centre.

TOURIST INFORMATION

You can find out more about Edinburgh and the surrounding area at visitscotland.com.

STAFF

Edinburgh Science Foundation is a pioneering educational charity dedicated to providing inspirational, innovative and thought provoking formal and informal science, technology, engineering and maths (STEM) engagement experiences for people of all ages and all backgrounds across the world. Registered Charity No. SC003790.

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EDINBURGH SCIENCE LEARNING

In addition to our Festival we deliver an extensive education programme, inspiring Scotland's young learners with the wonder of science and technology and helping teachers deliver the Curriculum for Excellence. *Generation Science* brings interactive science shows and workshops to primary schools all over the country and *Careers Hive* gives thousands of secondary pupils a unique immersive STEM focused careers experience. Find out more at sciencefestival.co.uk/education.

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PRINCIPAL FUNDING PARTNERS



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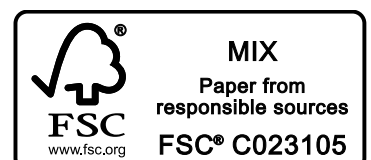


WITH THANKS

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New Park Educational Trust
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To find out more please contact our Development team on **0131 553 0324** or development@scifest.co.uk. Further information is available online at sciencefestival.co.uk/support-us.



EDINBURGH SCIENCE FESTIVAL AT CITY ART CENTRE



Explore five-floors packed with shows, workshops and interactive events perfect for children aged 3 years and over. Full details on page 9.

6-21 April [not Sundays]
Open daily **9.30am-4.30pm**

Venue sponsor

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