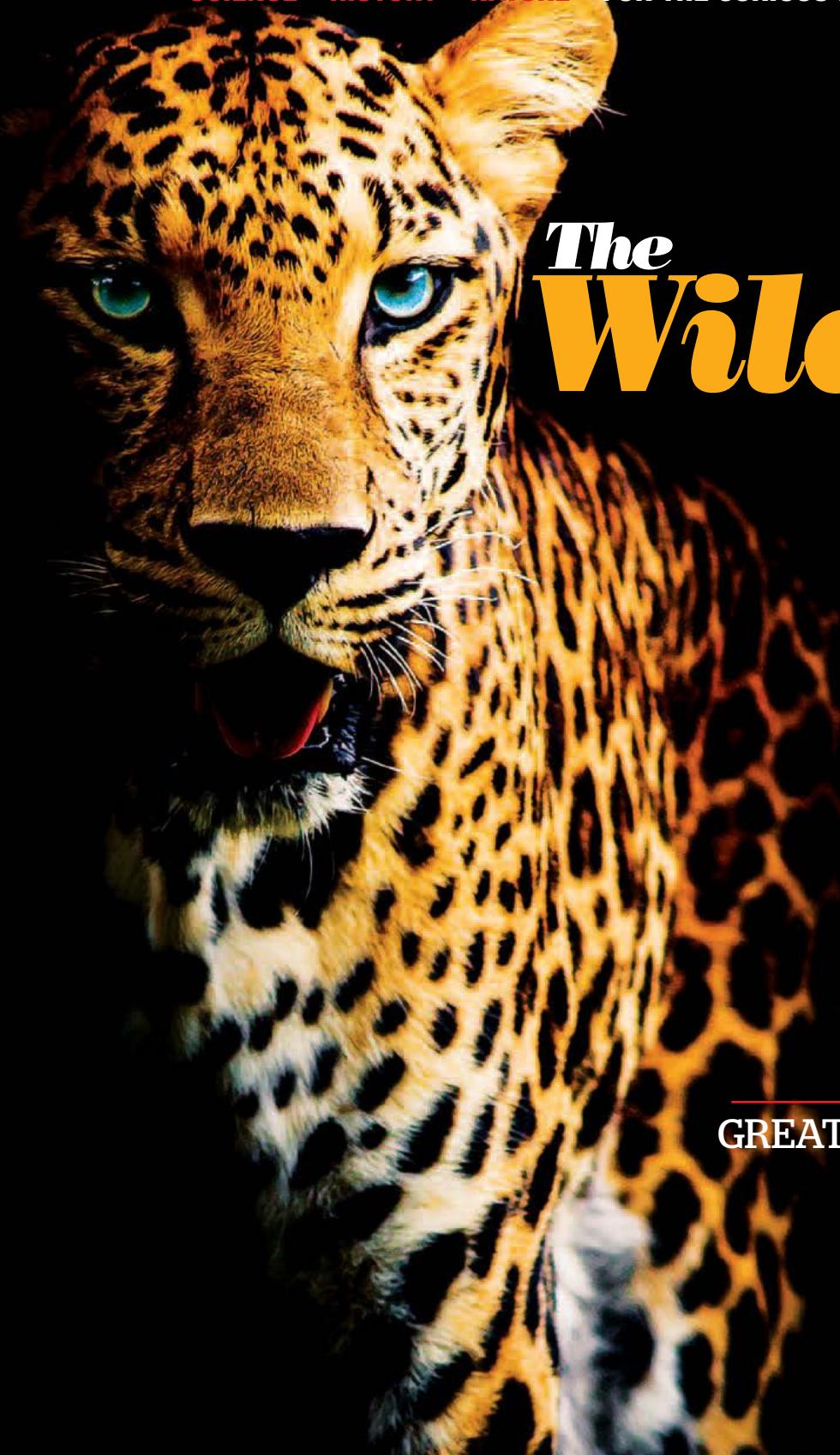
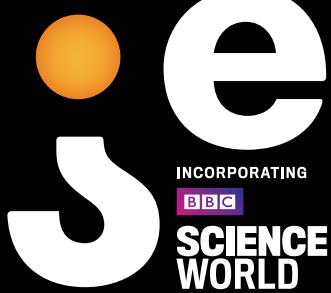


Volume 7 Issue 3 • April 2017 ₹125

# Knowledge

SCIENCE • HISTORY • NATURE • FOR THE CURIOUS MIND



## The Wildlife Special

WILDLIFE  
PARKS IN INDIA

THE URBAN JUNGLE

SNOW LEOPARDS  
WE KNOW

&amp;

WHY WE DANCE

THE LEGACY OF  
FIDEL CASTROGREAT INDIAN AUTHORS:  
ISMAT CHUGHTAI

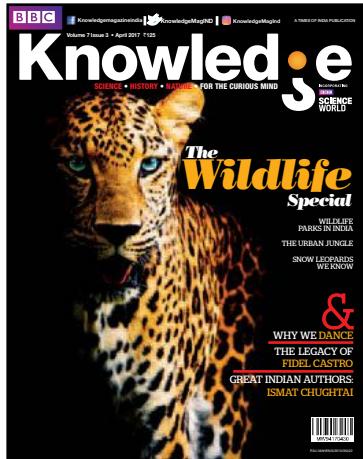


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# BBC Knowledge Contents



## 44 Cover story WHERE THE WILD LIVES

Ardent forest lover Sejal Mehta takes us on an exciting tour of India's wildlife parks



## Features

- 50** Welcome to the Jungle  
Leopards in the bustling city of Mumbai, India; hyenas running through the streets of Harar, Ethiopia; and bird-eating fish in Albi, France — Fredi Devas captures animals in the urban jungle

- 58** Saving the Ghost of the Mountain  
We track down Anu, a snow leopard in the Tost Mountains of Mongolia

- 74** This is why we Dance  
From foot stomping to dance beats, to swaying your hips to Shakira's tunes and an all-out energetic four-dance number, we break down the science behind why we dance

- 80** How should History remember Fidel Castro?  
A heroic champion or ruthless leader? Historians offer their opinions

- 84** Great Indian Authors: Ismat Chughtai  
Urvashi Butalia chronicles the life and work of one of her influencers, Ismat Chughtai, a writer who broke through the bastion of Urdu male writers



# Regulars



Knowledge

# Contents

## 8 Q&A

Let our panel of experts sprinkle their answer-dust over your questions

## 19 Discoveries & Innovations

Dispatches from the cutting edge of science, and the latest news tech from CES 2017

## 32 Books

Browse though our literary treasure trove stocked with the latest releases and bestsellers

## 34 Games

We deconstruct the legend of *The Legend of Zelda* and ring up the best consoles you should be playing with with your mates

## 36 Gadgets

The old foes are back – Microsoft versus Apple

## 38 News from the World of Travel & Food

See the northern lights in all their effervescent glory, and have a bite of spotted dick, if you will

## 40 Snapshots

Outstanding photographs that inform and engage

## 66 Portfolio: Under the Sea

Photographer Alex Mustard captures the colourful and happy profiles of the denizens of the deep

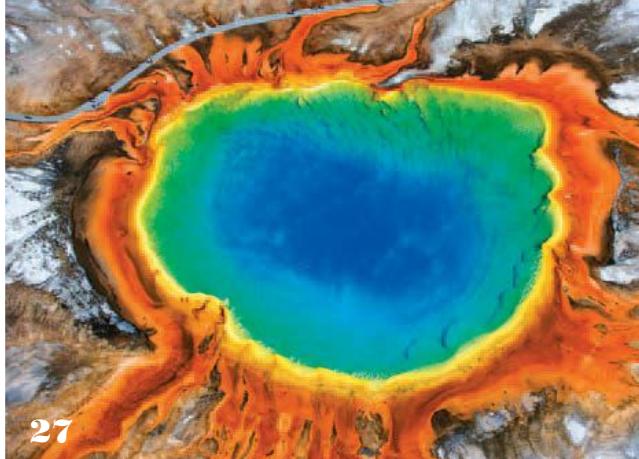
## 86 Puzzle Pit

Pick from a veritable buffet of brainteasers guaranteed to tickle your grey cells

## 90 In Focus: Dr Salim Ali

Presenting the Birdman of India, Dr Salim Ali, and the twist that immortalised him among India's ornithologists

84



27

90



66



32



38



# From the editor



## I've never seen a tiger in the wild.

No, really. I've seen sloth bears dancing with butterflies in Bandipur, one-horned rhinos too close in Chitwan, elephants even closer in Mudumalai. I've had the wealth of the Great Barrier Reef float past me as I snorkelled the deep.

But I've never seen a tiger in the wild.

I've heard the warning call of the monkeys and the deer, seen the pug marks on the forest floor made just minutes earlier. I've sat waiting for hours in a safari jeep behind a screen of scrub while the tiger feasted, grunting, on the other side.

And I've never seen a tiger in the wild.

And, you know what? That's fine with me.

The greatest thing about wildlife is that it's wild, free, unobliged to show itself. And that unpredictability of sightings is something to celebrate. It takes the pressure off the big animals, and calls on you to appreciate the smaller ones, the little creatures who are also so much a part of the wild wonderland.

This **special wildlife issue** has so many wonderful windows into the wild packed into it. We have the best Indian sanctuaries (and spoiler: they may not be the ones you're expecting), snow leopards, urban animals, and the colourful creatures of the deep...

As always, there's lots for you even if the wild doesn't rev your engines — personalities like feminist writer **Ismat Chughtai**, Birdman of India **Dr Salim Ali**, and historians' takes on how the world might remember **Fidel Castro**. There's a wonderful story on **why we dance**, which might explain India's obsession with *Jhalak Dikhhla Jaa*. We have **travel and food** that will make you want to explore our world, and, well, eat. And our **innovations section** this issue brings you all the latest from the Consumer Electronics Show this year — incredible inventions, dramatic new ideas, wild advancements...

Because it is a wild, exciting world out there — and it's time to go out and discover it.

**Primrose Monteiro-D'Souza**  
Editor & Chief Community Officer,  
*BBC Knowledge*

## EXPERTS THIS ISSUE



**Dr Charudutt Mishra** is the Snow Leopard Trust's Science & Conservation Director, and co-founder of India's Nature Conservation Foundation. Charu has come face to face with wild snow leopards on several occasions. In this issue, he talks about Anu.



**Matthias Fiechter** is Communications Manager for the Snow Leopard Trust. He tells stories about snow leopards and the people who work to protect them to wildlife lovers around the world. In this issue, he joins Dr Charu Mishra in telling the story of Anu.



**Fredi Devas** is the producer of the urban jungle episode of *Planet Earth II*. He spent four years getting to know the incredible animals living in the city. In this issue, he talks about animals in the city.



**Padma Shri Urvashi Bhutalia** is a prominent Indian author and publisher. In this issue, she profiles feminist powerhouse Ismat Chughtai.



## SEND US YOUR LETTERS

Has something you've read in *BBC Knowledge* intrigued or excited you? Write in and share it with us. We'd love to hear from you and we'll publish a selection of your comments in the forthcoming issues.

Email us at: [edit.bbcknowledge@wwm.co.in](mailto:edit.bbcknowledge@wwm.co.in)

We welcome your letters, while reserving the right to edit them for length and clarity. By sending us your letter, you permit us to publish it in the magazine. We regret that we cannot always reply personally to letters.

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# letters



**Samarpan Bhowmik, 30**  
media professional, Mumbai

Technology is an integral part of our lives today. Of course, given our reliance on it, we often don't realise the kind of effects it is having or may end up having on us in the long run. Thanks to the article you've carried on the subject, I now know. And I've shared this article with many friends too. Yes, ignorance may be bliss in many cases, but, if something is ruining my sleep cycle or eroding my attention span, I'd rather know about it, for better or worse.

Apart from your cover stories, I also really appreciate the sections on nature. The photography in the **Early Days** story is fantastic, as is the content in **Your Dogtor Will See You Now.**

Thanks, *BBC Knowledge*; this is just the first issue of the year, and I already can't wait for the rest of the year to unfold.



**Siddhi S. Rane, 14**  
Sarawati Vidyalaya, Thane,  
Maharashtra



*BBC Knowledge* is a nice educational and interesting magazine. It contains a lot of information on space, science, nature, history, books, etc. The columns and articles on the latest discoveries, technological advances and innovations are very interesting. The **Puzzle Pit** section and the photo story features are visually appealing. Sudha Murty's interview and the article on R K Narayan were very interesting and I learned new things about both these authors.

The portfolio section in the current issue, **Early Days**, was such a brilliant read! The feature gave me a much-needed look into the lives of baby animals. To me, this magazine is a big treasure of knowledge. *BBC Knowledge* is a big source of information of about every aspect of nature. I am eagerly waiting the next edition!



**Dhruv R. Wesavkar, 12**  
Arunodaya Public School,  
Thane, Maharashtra

I have always been a big fan of *BBC Knowledge*. In every issue, we get riddles, puzzles, crosswords, quizzes, games, etc, which children love to solve. *BBC Knowledge* also provides information about space, science, nature, Indian authors, etc. The **Q&A** section answers all the questions I've always wanted answered. In this issue, my favourite article is **Is Technology Changing Our Brains** by Jo Carlowe. It is a very interesting question: as technology is rapidly increasing, it is making us lazier. It also talks about how these days, we struggle to recall our own phone numbers when, a few years ago, we would recall dozens of phone numbers. This also shows that our memory power is partially decreasing. So I am requesting everyone: limit the use of your smartphones.



**Are left-handers smarter? • Why do knobs weaken a rope? • Does colour affect memory? • If you fell into a black hole, would time run fast or slow? • Why do phones explode?**

**EXPERT PANEL**

- Dr Michael Gazzaniga, Psychologist from the University of Dartmouth, US
- Professor David Eagleman, Neuroscientist at Baylor College of Medicine, US
- Professor Mark Changizi, Anthropologist at Brigham Young University, US
- Dr Peter G. Veltman, Psychologist at Dordrecht University, The Netherlands
- Luca Vilasi, Physicist at the University of Bari, Italy



**Saniya Patel, 14** Universal School, Mumbai

I read *BBC Knowledge* regularly and love it. My favourite topics are space, new technologies, and robots. The magazine has helped me in my understanding of the scientific world and the new advancement in the sphere of the world. It has also given my general knowledge a boost, which helps me to perform better in school. I remember it once also helped me in the National Science Olympiad, a competitive exam.

I also follow the *BBC Knowledge* Facebook page and check it every day because it gives me regular updates in my favourite fields of interest. I am a big fan of the #feelsmartagain and the #didyouknow series.



**Sonia Karandikar, 23** Thane, Maharashtra

I've been reading *BBC Knowledge* for a year now and I must say it has given me a different perspective to day-to-day things in life. Prior to reading the magazine, I was never really interested in science and technology-related news, but, now, I love to read about interesting quirks in science. I also love gadgets and the gadget section is my favourite in the magazine. In a way, I can say that my curiosity about the world has grown by leaps and bounds. Interestingly, every person in my family also makes it a point to read *BBC Knowledge*, but only after I have finished reading.

I loved the February 2017 issue cover story, **How Technology is Rewiring Your Brain**, and I found the interview with Sudha Murty very insightful. I'm quite fond of collecting covers of national and international magazines. Your February 2017 issue cover is now in my collection.

I would like to add that the Facebook page and other social media outlets of *BBC Knowledge* are also well updated and I love to check out the page every once in a while.

Keep adding the knowledge doses!

**Manoj Kulkarni, 48** Mumbai



A couple of years ago, I picked up an issue of *BBC Knowledge* for the first time and was pleasantly surprised. Starting from the aesthetic look to the array of topics covered to the knack of making complex things simple, relevant and digestible, I found this a complete package for anyone who needs answers to a lot of questions. I bought that first issue for my kids, but our whole family is glued to it now. Look at the amazing range of topics this magazine covers – from evolution to AI, from trigonometry to technology from stem cells to stratosphere and from history to robotics. Seriously, who says *BBC Knowledge* is for children? In comparison, our school text books seem so dry... Keep up the good work (and try to get in touch with education boards to make their books better).

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I, Joji Varghese, hereby declare that the particulars given above are true to the best of my knowledge and belief.

Date: March 1, 2017

(Joji Varghese)  
Signature of the Publisher

# ARE GRADES IMPORTANT?

Two of the country's leading educators weigh in on the importance of marks in learning



"The primary role of education is to equip people with the knowledge and confidence to make a difference in the transformation of society. In addition to providing students with knowledge, education helps instill values, attitudes and behaviours that align with those expected in a society.

"Education prepares students for career challenges. Because many different paths to success exist today, different students need different outcomes from their experiences in the educational system. So, education must prepare students to think critically and select the opportunities that they need in order to succeed in their chosen path.

"Children should have authentic learning experiences, from projects to real-world field trips. It's through that variety of strategy, skill and application that we will really push our kids to become global, critical thinkers fit for today's fast-changing world. "In my opinion, a school should help educators to identify areas of strength, areas requiring improvement, and decide on the further steps to be taken. The school can act as a catalyst for shared instructional leadership through focus on high levels of student learning and achievement.

"The school can support educators in determining explicit, intentional and precise improvement planning decisions that inform monitoring and feedback for continuous improvement and future planning, achievement and wellbeing. "Using the Four-Step Inquiry Process for Education, Career and Life Skills, children can be prompted to reflect on who they are, what their opportunities are, who/what they want to become, and what their plan is to achieve their goals. The student can also be encouraged to make an individual Pathways Plan that they can freely follow or change when appropriate.

**"A good head and good heart are always a formidable combination. But, when you add to that a literate tongue or pen, then you have something very special."**

**Dr Ayyappan**

Director – Education, Sree Gokulam Public Schools, Kerala

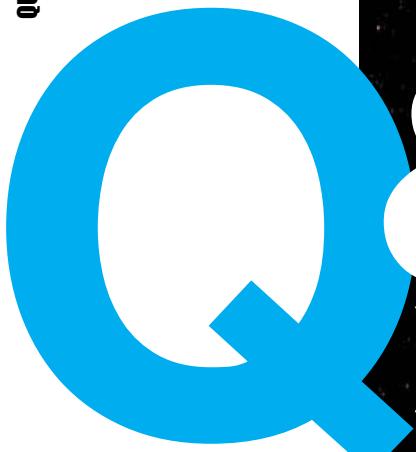


**"While grades provide a basic threshold and have a place in the educational system,** they shouldn't be considered the only metric for the growth of a student in school. There are so many more elements that make up the plurality of a child's identity. Condensing all those factors to one letter or number tells us nothing of their desires or ambitions, their empathy and passion or their relationship with others; all of which are crucial building blocks that contribute to the success of a child in and out of school."

**Kiran Bir Sethi**  
Founder – The Riverside School,  
Ahmedabad, Gujarat

**NEW!**

Panel of Principals is a knowledge circle that taps into the collective wisdom of educators and academicians



# Q & A

## YOUR QUESTIONS ANSWERED



---

**Dr Alastair Gunn**  
Astronomer, astrophysicist

---

**Alexandra Cheung**  
Environment/ climate expert

---

**Dr Peter J Bentley**  
Computer scientist, author

---

**Prof Alice Gregory**  
Psychologist, sleep expert

---

**Prof Mark Lorch**  
Chemist, science writer

---

**Dr Helen Scales**  
Marine biologist, writer

---

**Dr Christian Jarrett**  
Neuroscientist, writer

---

**Luis Villazon**  
Science/tech writer

---

**Dr Aarathi Prasad**  
Biologist, geneticist

---

**Prof Robert Matthews**  
Physicist, science writer



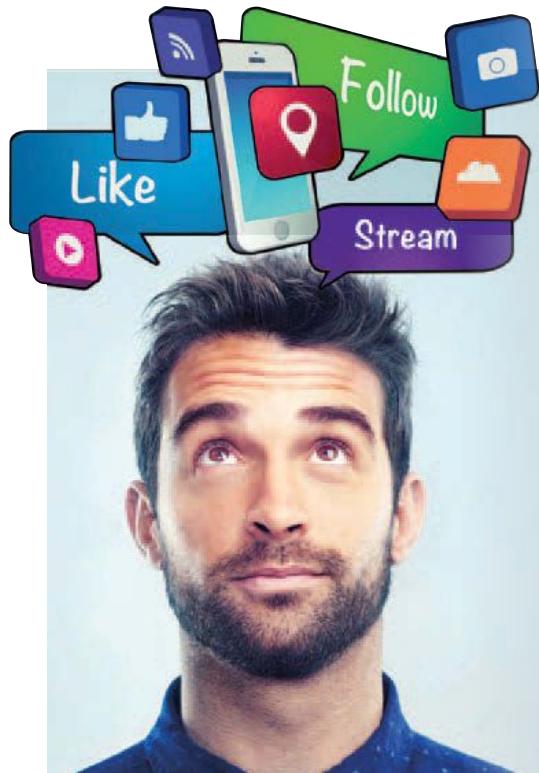
# Will it ever be possible to build a space elevator?

First proposed over a century ago by the Russian astronautical pioneer Konstantin Tsiolkovsky, the space elevator offers a whole new way of getting into orbit. Instead of using rockets, electric lifts travel up a cable anchored at the Earth's equator and extending up to an orbiting counterweight whose motion

keeps the cable taut. But, while simple in concept, the practicalities are immense. Chief among them is the need for a cable material that's capable of withstanding the colossal tension. It's long been thought that carbon nanotubes would be up to the job, but new research by a team at Hong Kong Polytechnic University has shown that a single misplaced atom in the cable could radically undermine its strength.

With no real prospect of creating a defect-free cable, the search is now on for more robust materials. RM

ISTOCK/SCIENCE PHOTO LIBRARY



## Will we ever be able to log onto Facebook with our minds?

Surprisingly, the answer is 'yes'. Research at Binghamton University in the US found that every person has a unique pattern of brain activity when shown a series of images. In the study, a computer measured the brainwaves of 45 volunteers and was able to determine the identity of each person with 100 per cent accuracy. This means that your 'brain print' could be a very effective way to enable secure login to computer systems, including Facebook. The only problem remaining is how to measure your brainwaves in an easy way – right now, you need to wear a special hat full of sensors and wires. PB



## Do identical twins think alike?

The genes we inherit from our parents influence our psychological characteristics – things like our intelligence and memory ability – and our chances of developing conditions that affect the way we think, such as autism and schizophrenia. In that sense, identical twins – who share all the same genes – do think more alike than unrelated people

or even non-identical twins and other siblings. Brain-imaging research has shown that, during mental tasks, such as memorising numbers, the patterns of brain activity (which can be considered a physical correlate of thought) are more similar among identical twins than non-identical twins. CJ

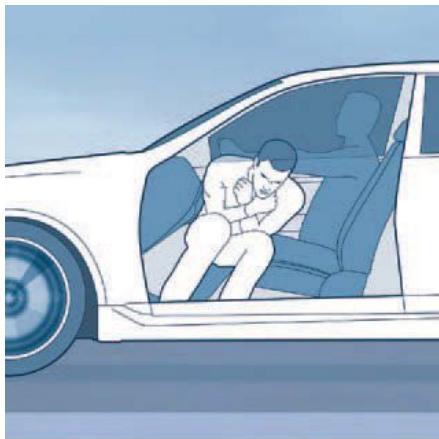
### THE THOUGHT EXPERIMENT

## How can I jump safely from a moving car?



### 1 TIMING

'Safely' is unrealistic. However, you can make it survivable with a little bit of planning. If you are sitting in the left seat, wait until the car is travelling around a bend to the right, so you will be thrown clear of the car. Make sure there are no oncoming signposts.



### 2 ANGLE

To protect your elbows, stuff your sleeves with paper or cloth. Crouch in the footwell, facing the door. Push the door open and jump out at a 45° angle. Pull your elbows in and put your fists under your chin. Keep your legs together and don't try to land on your feet.

## Are there different types of earwax?

Just two. The most common, wet earwax, evolved as a way to remove dead skin cells from your ear canal. Earwax is 60 per cent skin, with various different oils binding it together in a brown lump. But there is a recessive gene mutation that results in a different mix of oils, giving grey and flaky earwax. This dry earwax is common among the Japanese and Native Americans. Coincidentally, having dry earwax also means you produce less armpit odour. LV



### 3 IMPACT

Aim to land on your back. This is the widest part of the body and will spread the impact force most evenly. Keep your limbs and neck tensed to prevent them flailing, and allow your body to roll. Resist the urge to put your hands out, otherwise you will break your wrists.

# WHY DO WE DREAM?



People with damage to the brain's parietal lobe, which integrates sensory information, don't dream. One hypothesis suggests that while we sleep, the parietal lobe continues generating signals, and our forebrain tries to make a story out of this activity.

Other researchers have suggested that dreams occur when short-term memories are encoded and moved to long-term memory, or when unwanted connections are removed from memory.

Evolutionary psychologists contend that dreams have a specific survival value. We mostly dream about threats or stressful situations. This may be so we can safely rehearse strategies for dealing with them. LV

## IN NUMBERS

**27**

**The number of genes on the human Y chromosome. In comparison, the X chromosome has around 1,000.**

**13**

**The speed, in km/h, that cyclists should travel at while commuting, to avoid breathing in too many pollutants. Those who cycle faster inhale up to four times as much air pollution because they breathe more heavily.**

**24**

**The number of distinct academic families that two-thirds of the world's mathematicians fall into**

## WHY DO HARD-BOILED EGGS SOMETIMES GET A GREY RING ROUND THE YOLK?

Egg white is 92 per cent water, with a mixture of around 148 different proteins, mainly ovalbumin, ovotransferrin and ovomucoid.

At room temperature, these proteins are held in a complex 3D globular structure by sulphur bonds between the amino acids in the protein chain. When the egg cooks, the heat causes the sulphur bonds to come undone so each protein molecule unravels and gets tangled up with its neighbours in a solid mass. This process happens at 77°C for ovalbumin. But, above 70°C, the sulphur also forms hydrogen sulphide that reacts with iron in the egg yolk to form iron sulphide, and this gives it a greenish grey colour. You can prevent this by running the eggs under the cold tap to lower their temperature as soon as they are cooked. LV



## TOP 10

**HIGHEST FLYING BIRDS****1**

Rüppell's griffon vulture  
Altitude: 11,300m  
Distribution: Sahel region, Africa

**2**

Common crane  
Altitude: 10,000m  
Distribution: Northern Europe and Asia

**3**

Whooper swan  
Altitude: 8,200m  
Distribution: Europe and Asia

**4**

Alpine chough  
Altitude: 8,000m  
Distribution: Mountains from Spain to China

**5**

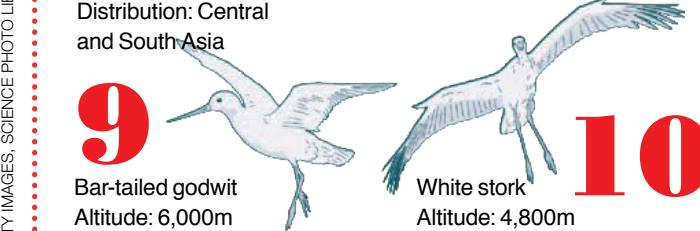
Lammergeier  
Altitude: 7,300m  
Distribution: Mountains in Europe, Asia and Africa

**6**

Andean condor  
Altitude: 6,500m  
Distribution: Andes, South America

**7**

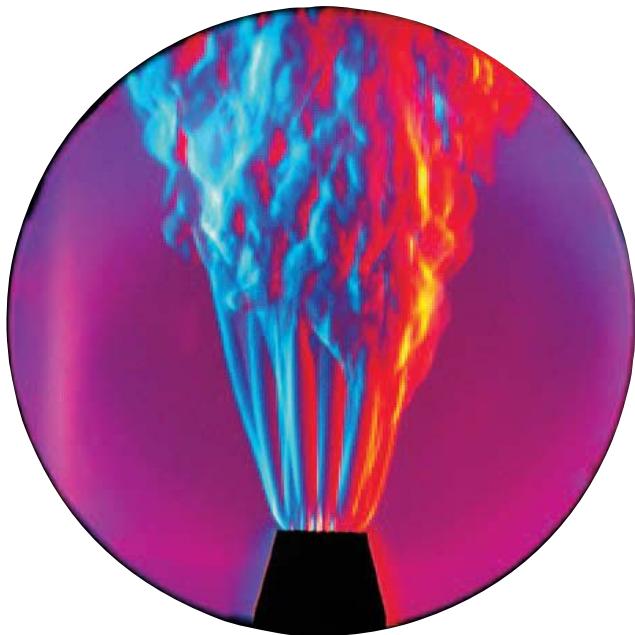
Bar-headed goose  
Altitude: 6,437m  
Distribution: Central and South Asia

**9**

Bar-tailed godwit  
Altitude: 6,000m  
Distribution: Northern Europe, northern Asia and Alaska

**10**

White stork  
Altitude: 4,800m  
Distribution: Europe, North Africa and western Asia

**Why are gases invisible?**

Actually, gases aren't invisible: many are quite brightly coloured. For example, nitrogen dioxide is brown-y orange, chlorine has a yellowish green hue and iodine vapour is a vivid purple. Other gases in the atmosphere (particularly oxygen, carbon dioxide and water vapour) also absorb light, but at ultraviolet and infrared wavelengths that we can't see. There's a sweet spot between the absorption spectra of oxygen and water where not much light gets absorbed. Lo and behold, that's exactly the range of light that we've evolved to see! So it's not that gases are invisible, as such; it's just that we can't see atmospheric gases as they don't have a colour in the visible range. ML

If you hold  
in a **FART**,  
where does it go?



It stays right there! Fart gas mostly comes from the bacteria and yeasts that live in the large intestine. If you suppress a fart, it actually just seeps out more quietly, or you might be able to hang on until the next time you are on the toilet. But sooner or later, that fart is coming out! LV



French engineer and professional violinist Laurent Bernadac poses with the 3Dvarius, a 3D printed electric violin made from transparent resin

## Would a 3D-printed instrument sound the same as a normal one?

There is no reason you can't 3D print a musical instrument. Cheap violins have been made out of plastic for years, and 3D printing is just a handy way of assembling them. An electric violin converts the string vibrations into an electrical signal, so it doesn't depend on the acoustic properties of the resonating chamber. A 3D-printed trumpet might also work well, but an acoustic violin made of plastic can't compete with a Stradivarius yet. The complex grain structure of the wood creates subtle resonances and harmonics that we can't recreate with the resolution of current 3D printers. LV



"Come and have a go! It smells lovely!"

## Why do dogs like rolling in fox poo?

One theory is that it's a hunting behaviour that evolved as a way to mask the dog's own scent to make it easier to stalk prey. It's odd that a dog would choose the poo of another predator though. It may be that, for most dogs, fox poo is the only really stinky poo they have access to. Cows and horses are kept away in their own fields and cats bury their poo neatly. LV

## Why does reading make you sleepy?

Typically when we're reading, we do it in a comfortable position – sitting or lying down – in a quiet place, and often at the end of the day or after more energetic activities, all of which contributes to a state of relaxation and sleepiness. Also, an absorbing text will take your focus away from the outside world and from anxieties that might otherwise keep us alert, such as worries about tomorrow's exam or dentist appointment. Alternatively, if you find what you're reading boring, the effort to keep going can be tiring, in which case you'll likely begin to daydream, which can also bring sleep closer. CJ



## How long before extra calories show on the scales?



If you step on the scales as soon as you have eaten a jam doughnut for lunch, you will weigh an extra 70g, because this is the mass of the doughnut itself. But 22g of this is water, which you'll lose over the next few hours in your breath and urine. You'll lose another 2g sometime tomorrow, when you poop out the small amount of dietary fibre.

The other 46g is digested and, if your body doesn't immediately need it to grow or for energy, it is stored as fat. A 2012 study at Oxford University found that the fat in your food ends up on your waistline in less than four hours. Carb and protein take a little longer, because they need to be converted into fat in the liver first and it takes nine calories of protein or carbohydrate to make 1g of fat. Altogether, that doughnut has about 225 calories. Around 100 of those come from the 11g of fat in the doughnut, which will be on your waistline by teatime. Then the 125 calories of carbs and protein will be converted into another 14g of body fat sometime tomorrow, unless you hit the gym after work and burn it off again. LV



## Will I weigh less if I move to the equator?

As our planet bulges at the equator, its gravitational pull there is lower than in the UK. Better still, the effect of the spin of the Earth at the equator also helps offset the force of gravity. The bad news is that even the combined effect would reduce your weight by less than 1 per cent – so it's probably easier, all told, just to cut back on the beer and pies. RM

WHAT CONNECTS...

## ...BANANAS AND PROSTHETIC LIMBS?



1.

A discarded banana peel is extremely slippery. The friction between the peel and a smooth floor is six times lower than between the floor and your shoe.

2.

The slipperiness comes from the follicle cells on the inside of the peel. When they are crushed underfoot, they release a polysaccharide gel between the floor and the peel.



3.

This gel is so slippery, it is actually a better lubricant than the oil used in metal bearings. It's only slightly less slippery than a ski on snow!



4.

Polysaccharide gels are also found in the membranes covering our bones at the joints. Research into banana peel slip-ups is helping to improve the design of joints in prosthetic limbs.





## How do we predict meteor shower intensity?

Most 'predictions' of the rate of meteors per hour during meteor showers are based on both theory and observation. Essentially, a computer model is built containing the trajectories of every known comet – since it is the debris from comets that forms the 'stream' of particles we see during a meteor shower. This model contains information on the rate at which these comets release material, along with the sizes, directions and velocities at which they are released, as well as the gravitational forces that determine their subsequent trajectories through space. The trajectory of the Earth and the conditions of the Earth's atmosphere are also inputted into the computer model. By watching how Earth moves through the meteor stream, it is possible to estimate the likely number of meteors that will be visible during a given shower for a given location. But different astronomers use different models. Plus, these models are partly based on difficult measurements of the meteoric particles in the Solar System, so their predictions are often only approximate. But, generally, they can be used to reliably predict when a meteor shower is likely to be more or less intense than the average. AG

# BLOOMING IN THE DESERT!

*Marvel at how seasonal rain in Namaqualand, South Africa, transforms the semi-arid region into a carpet of flowers*

Flowers blooming? In the desert? Yes! And it's a regular phenomenon, much like how birds fly south for winter. On the west coast of South Africa lies Namaqualand, a 1000km stretch of desert land, where nary a flower blooms.

Except during the months of August and September. Known in South Africa as the Namaqualand Daisy Season, this spring phenomenon is linked to the region's predictable rainfall pattern. During the winter months of May and July, the region receives its highest and heaviest rainfall, and, come spring, every bit of the landscape, including the rocky bits and hills, is covered in flowers, bursting out in eclectic and vivid colours.

Through the rest of the year, seeds of wild flowers sit waiting in the soil for the late winter rains. The blooming is largely dependent on the winds, rain and the spring sun. Species of wildflowers found here are the yellow sparaxis, purple geraniums, and snow protea, which are indigenous to this region. The flowers are at their vibrant best during the day, attracting visitors, human and insects, the former to see them and the latter to pollinate them. At night, they seem to tuck their heads in, saving their energy for another bright, sunny day.

Come see the flowers in the desert!

Visit [www.southafrica.net](http://www.southafrica.net) for more information

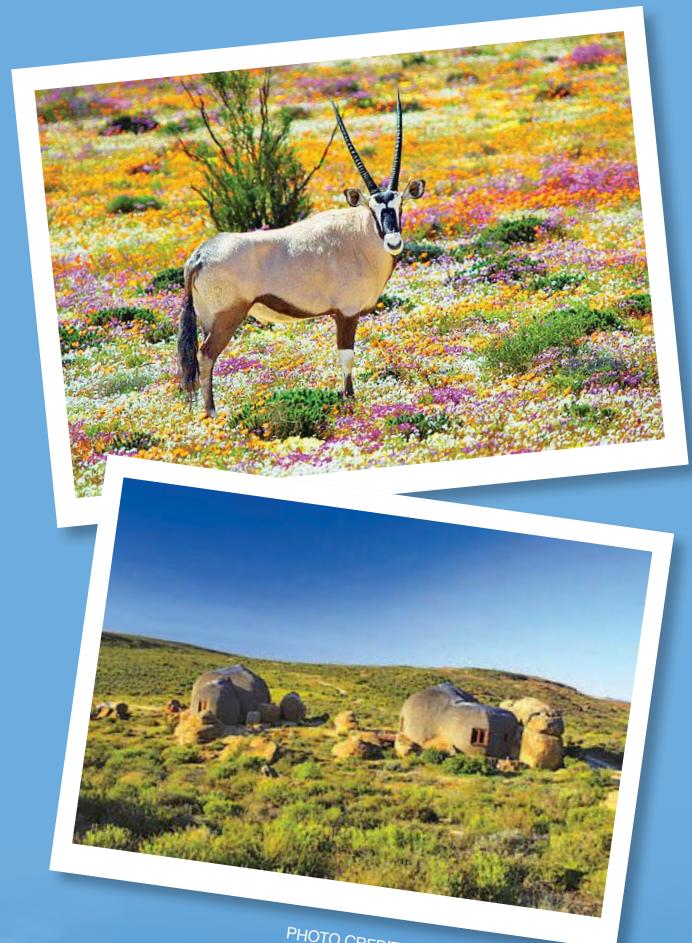


PHOTO CREDIT: WWW.SA-VENUES.COM X2



Inspiring new ways



## What happens at absolute zero?

In one sense, we can never know because reaching absolute zero is an impossible task as an infinite amount of work is required to cool something down that far. However, you can get close – the world record coldest temperature is 0.0000000001°C above absolute zero. At super cold temperatures, strange

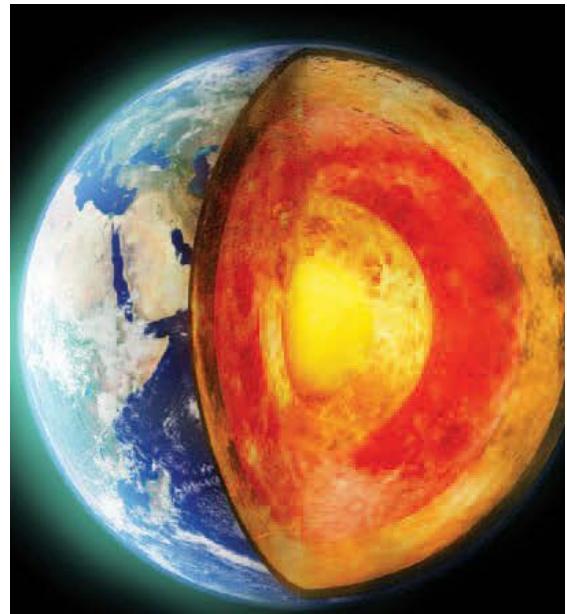
things start occurring. Exotic states of matter appear, such as superfluids that have no friction and viscosity and so climb out of their containers; superconductors which have zero electrical resistance, and Bose-Einstein condensates, where atoms act totally in unison and never collide. ML



## What's the biggest robot in the world?

According to the *Guinness Book Of Records*, the largest walking robot in the world is reported to be Tradinno, a 15m-long dragon robot weighing 11 tonnes that was used in a German theatre for the play *Drachenstich*. Powered by a two-litre turbo diesel engine, it can breathe flames to a distance of 1.5 metres. However, in the future, this dragon will be like a toy compared to the 200m-long robot container ship Vindskip planned for construction, which would traverse the seas using its giant sides as sails, and its computer brain to keep its course. PB

VINDSKIP VED KAUSE, GETTYIMAGES, ISTOCK



## WILL EARTH'S INTERIOR EVER BECOME SOLID?

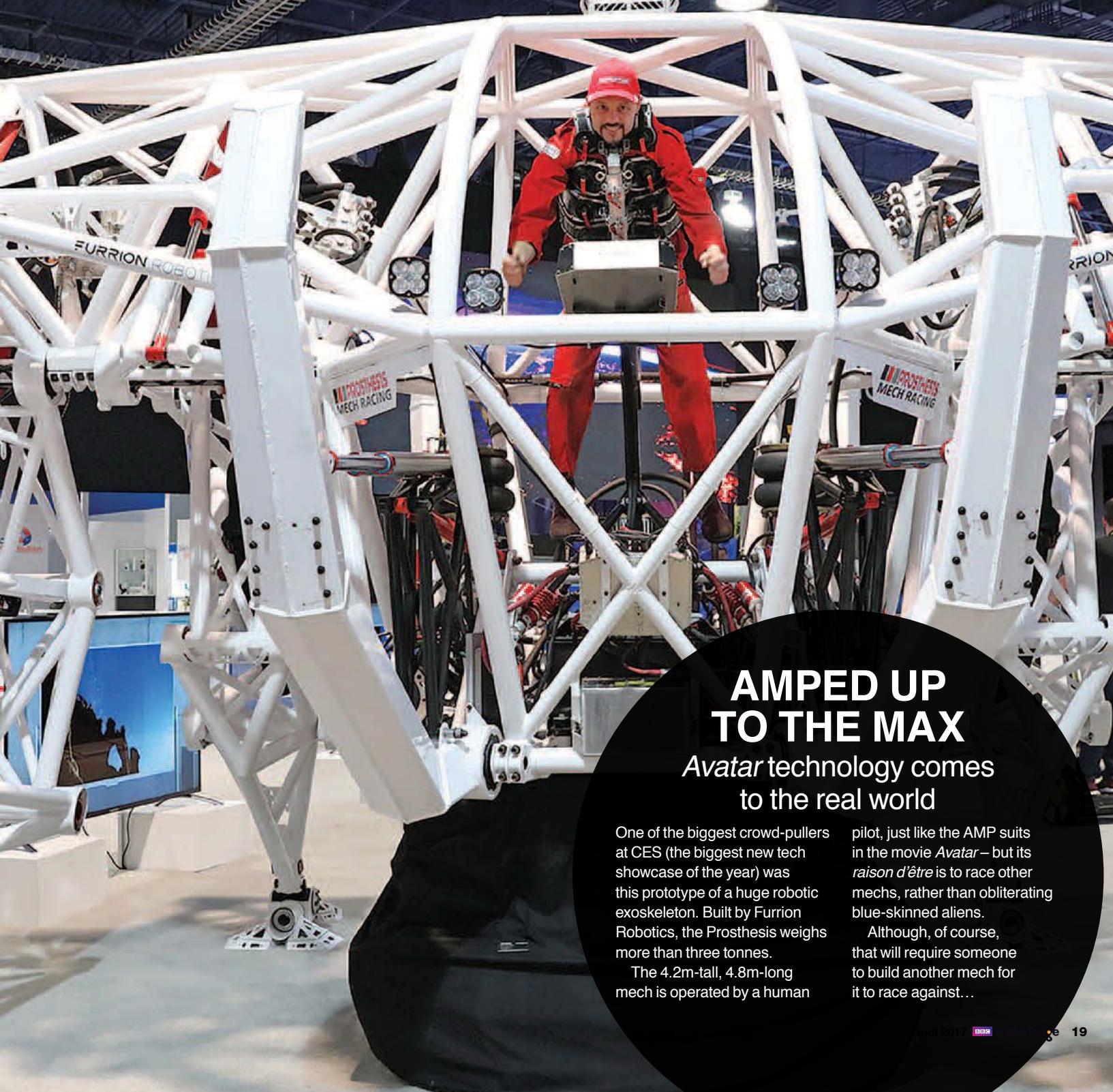
Beneath us all is a seething cauldron of rock, wrapped round an iron-nickel core at temperatures similar to the surface of the Sun. Most of the heat comes from radioactive decay of elements like uranium in the surrounding mantle.

As this process will continue for billions of years yet, the Earth is likely to have been destroyed by the death of the Sun before it can solidify. RM

# INNOVATIONS

PREPARE YOURSELF FOR TOMORROW

CONSUMER ELECTRONICS SHOW 2017 SPECIAL



## AMPED UP TO THE MAX

*Avatar* technology comes  
to the real world

One of the biggest crowd-pullers at CES (the biggest new tech showcase of the year) was this prototype of a huge robotic exoskeleton. Built by Furrion Robotics, the Prosthesis weighs more than three tonnes.

The 4.2m-tall, 4.8m-long mech is operated by a human

pilot, just like the AMP suits in the movie *Avatar* – but its *raison d'être* is to race other mechs, rather than obliterating blue-skinned aliens.

Although, of course, that will require someone to build another mech for it to race against...

# Nissan and NASA clear roadblocks to a driverless future

Nissan plans to get autonomous cars driving on our city streets by 2020, with a little help from NASA. In fact, you can stick this date in your calendar, as this seems to be when the big car companies attending CES say we'll see autonomous models in their showrooms. One of the biggest roadblocks to this driverless future is, well, roadblocks. When a driver encounters an obstruction, like road works, they have to break the rules of the road to get around: crossing a white line or driving towards oncoming traffic. But how do you code an AI to do the same thing – to act against its own programming? Nissan thinks it has found an answer – on Mars.

The Mars Curiosity Rover has been poolng about the Red Planet's surface without a driver for almost five years.

Though there aren't many building sites or cyclists on Mars, Curiosity has to be able to handle the unexpected. Rather than depend wholly on the rover's AI, when Curiosity gets stuck it calls a human operator back on Earth.

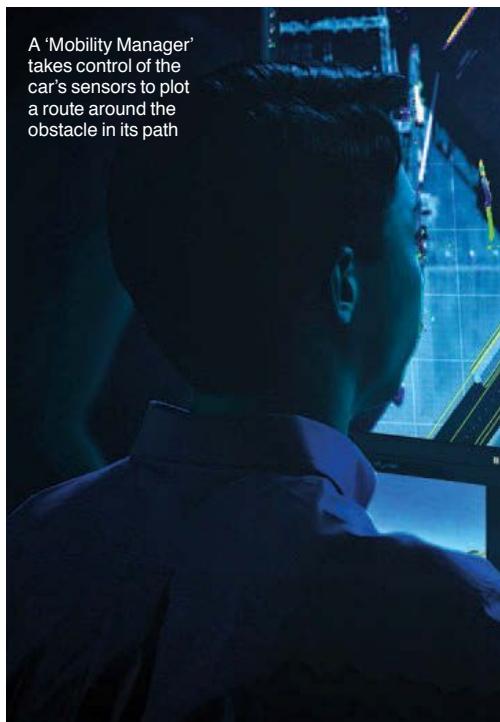
Nissan intends to do the same with SAM, its Seamless Autonomous Mobility system.

When a driverless car encounters an obstacle it can't navigate within its programming, it'll call up a 'Mobility Manager,' who will access the car's cameras and location, and pull up the most accurate mapping data the system can find. From there, the remote pilot can 'paint' a new, safe route around the obstacle, saving each new solution at a given location to allow for a quicker response the second time around. At CES, we were shown a live demo of the tech at a NASA facility, where the whole procedure took under a minute, and the data transfer appeared to be seamless. Of course we were

## TRULY DRIVERLESS VEHICLES

concerned, given that we seem to lose all mobile phone signal on much of the M25, that connectivity would be an issue. But Nissan says that the link will be optimised to handle delays – after all, it's worked for interplanetary use before.

It might feel slightly counter-productive to get drivers to help us drive driverless cars, but SAM is the only system we've seen so far that could potentially remove the need for someone to sit behind the wheel. Nissan is also partnering with Microsoft to provide Cortana-based voice control in its car, with the bonus that Cortana's voice recognition should help make the entire system more secure.

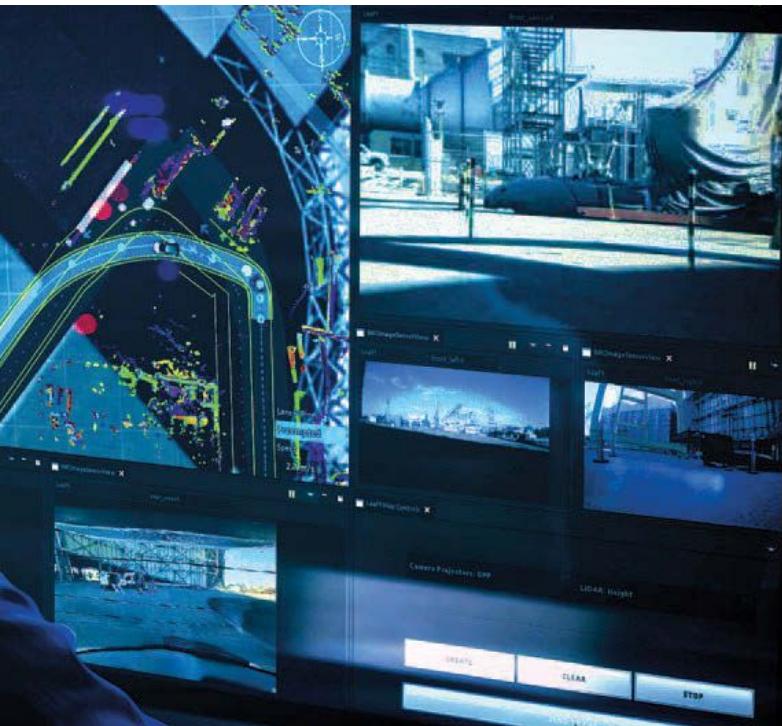




The Intelligent Mobility Concept car from Nissan would use SAM, the car manufacturer's Seamless Autonomous Mobility system

## EVERYONE WANTS TO TALK TO ALEXA

This year's CES was positively bursting with gadgetry that works with Amazon's AI personal assistant Alexa – the Siri/Cortana-like 'voice' of Amazon Echo. Ranging from an outright Echo competitor (the Lenovo Smart Assistant) to Ford's SYNC3 in-car infotainment system, via robot vacuum cleaners, security cameras, Huawei's Mate 9 phone and 'smart' light bulbs, plugs and kitchen appliances galore, there were over 30 such products on display – more than the number of Siri or Google Home-enabled devices put together.



## GARDENING FOR GEEKS

If you fancy growing your own food but are hampered by not having a garden, you'll love this invention from Estonia's Natufia Labs. The Kitchen Garden is an indoor incubator that'll let you grow herbs and vegetables inside a high-tech hydroponic cabinet with a footprint of just 590 x 580mm. It's equipped with an array of sensors that send data about growing conditions to a smartphone app, and it even plays ambient and classical music to the plants to promote growth. ▶





## WIRELESS POWER AT A DISTANCE

Imagine being able to charge your laptop, phone or tablet from a distance. That's the promise offered by WiTricity, a new wireless charging technology developed by two professors at MIT. WiTricity uses a technique the professors first demonstrated in 2007, which makes use of natural resonant frequencies. This is the phenomenon whereby a wine glass will shatter if an opera singer hits a certain note, because objects resonating at their natural frequency can take in much more energy.

Since it uses a power source and capture device with similar natural frequencies, WiTricity's system enables faster, more efficient power transfer over greater distances than existing wireless charging systems that rely on electromagnetic induction alone. There's no word yet as to when WiTricity might be available as a consumer product, but Dell has already announced that its next generation of laptops will support the tech, and other manufacturers are expected to follow suit.

## ULTRA-PERSONAL AUDIO SYSTEM

French company Akoustic Arts has developed a directional loudspeaker called A that only one person can hear at a time – without needing headphones. A works by transposing sound frequencies, shifting audible sound into the ultrasonic realm. The resulting ultrasonic signal is then fired out like a laser beam from the A, at which point the signal will transpose itself back into audible sound but, crucially, retain its ultra-directional nature. The result is a speaker that lets you listen to loud music without disturbing those around you.

A smashed its Indiegogo funding target last year, but there's no word on a release date – though as the product was on show at CES, it's presumably not far off. We're quite excited, as we'll no longer have to suffer our colleagues' definition of music.

KEEP  
THE NOISE  
DOWN



## OFFICE SILENCER

French company Orfea Acoustique has developed Silent Space, which is essentially a noise cancellation system for entire rooms rather than your headphones. Designed for use in open-plan offices and other shared workspaces, the Silent Space system consists of a central controller, plus a number of satellite speakers (or 'diffusers', as Orfea calls them). The controller unit analyses the timbre and levels of ambient sound in the room, then instructs the diffusers to pump out a masking signal to match. These unobtrusive tones will cancel out the general hubbub of office life, such as the clank and whirl of the printer, or the telephone chatter of the sales team across the room. The result, says Orfea, is that "a virtual cocoon is created around each co-worker... which results in the feeling of a more private work space." The company goes on to claim that this will lead to a significant reduction in stress, fatigue and irritation among staff, and, ultimately, to reduced absenteeism.

And because prevention is better than cure, you can also add a 'collective noise indicator' that lights up to show how loud the background noise in the room really is – hopefully encouraging your colleagues to keep their voices down a bit!



## THE INTERNET OF DAFT THINGS

There was no shortage of, ahem, 'surprising' IoT tech at CES...



French start-up Uzer was showing off Eugene, a smart kitchen bin that uses a barcode scanner to encourage you to recycle product packaging; it can also add the item to your next online shopping order.



Also on show was Oombrella – an umbrella equipped with air pressure, temperature, humidity and light sensors that gives you up to 15 minutes' notice of imminent rain. Because we all have our brollies out when it's dry...



L'Oreal was at CES demonstrating Hair Coach, a smart hairbrush with a built-in microphone, gyroscope and altimeter that listens for the sound of split ends breaking and tells you off (via Bluetooth and an app) for getting your brushing technique wrong.



But perhaps our 'favourite' was Kissenger – a prototype silicon iPhone add-on that uses pressure sensors and actuators to mimic the feel of a distant loved one's kiss. Frankly, hitherto unsuspected heights of unnecessary wrongness are being scaled here...>

# WANTED

## CES 2017 SPECIAL



### PAPER PLANE

**POWERUP FPV**

This assemble-it-yourself drone will give you a bird's-eye view of what it's like to fly. First build the plane, using the supplied templates or your own design. Next, put your Android or iOS phone into the Google Cardboard-certified VR headset. You can then control the plane via head movements, while enjoying first-person footage streamed live via Wi-Fi from its wide-angle camera. Boasting a top speed of 32km/h (20mph), the plane features a carbon-fibre polypropylene frame and auto-stabilisation system, weighs 80g and flies for 10 minutes off a single charge (\$ 200; [www.poweruptoys.com](http://www.poweruptoys.com)).



The plane comes complete with Google Cardboard-certified VR headset – just add a smartphone



## TALK TO THE ANIMALS

### TOYMAIL TALKIES

It may look like just another cuddly toy, but what you see here is actually a state-of-the-art communications system for under-10s. Toymail made its name with cutesy devices for kids that sent and received voice messages to and from their parents' smartphones; now its latest product comes as a stuffed toy, and youngsters can use it to talk to each other as well as Mum and Dad. A Talkies app store will also let parents send songs and stories to the toys (\$ 59; [www.toymail.co](http://www.toymail.co)).

## SMART SWIMWEAR



### NEVIANO UV CONNECT

This high-tech bikini features a built-in UV sensor that connects via Bluetooth to an app on your iOS or Android smartphone. Select your skin type within the app and it will send an alert to your phone whenever you've been out in the sunshine too long, thus avoiding both sunburn and the rather more serious problem of malignant melanoma. You can even have it send an alert to your partner's phone, to tell them you need some more sunscreen (\$ 142; [www.spinali-design.com](http://www.spinali-design.com))

## SPOT ON

### NVIDIA SPOT

Users of Nvidia's SHIELD Android TV set-top box will soon be able to add this \$ 50 microphone/speaker combo, which plugs into any available wall socket and works in a similar way to Amazon Echo and Google Home. Powered like the latter by Google Assistant, you can use it to control smart home/IoT devices, navigate YouTube, Netflix, Amazon Video, Google Play and Vudu using voice commands, search the web, order takeaway food, and more (\$ 50; [www.nvidia.com](http://www.nvidia.com)).<sup>1</sup>



## IS IT A PLANE? NO, IT'S...

### X PLUS ONE

This hybrid drone combines four sets of blades (as found on a quadcopter) with a 'flying wing' design, meaning you get the high speeds possible with the latter, combined with the vertical take-off and landing and hovering capabilities of the former. It comes with a handheld controller but can also be flown using a smartphone or tablet, has a top speed of 100km/h (60mph) and, naturally, is built to carry a GoPro or other action camera (\$495 – \$895; [www.xcraft.io](http://www.xcraft.io)).



## WHEEL-Y CLEVER

### ROOL'IN E-SUNNY

Electric bicycles are increasingly popular, but they're expensive. This new invention from French start-up Rool'in, on the other hand, lets you convert almost any bike into an electric one simply by changing a wheel! It's equipped with photovoltaic cells that'll provide enough electricity to power you along for up to 30km, while an accompanying smartphone lets you choose your 'assistance level' and provides data on distance travelled, average speed and so on ([www.rool-in.com/uk](http://www.rool-in.com/uk)).



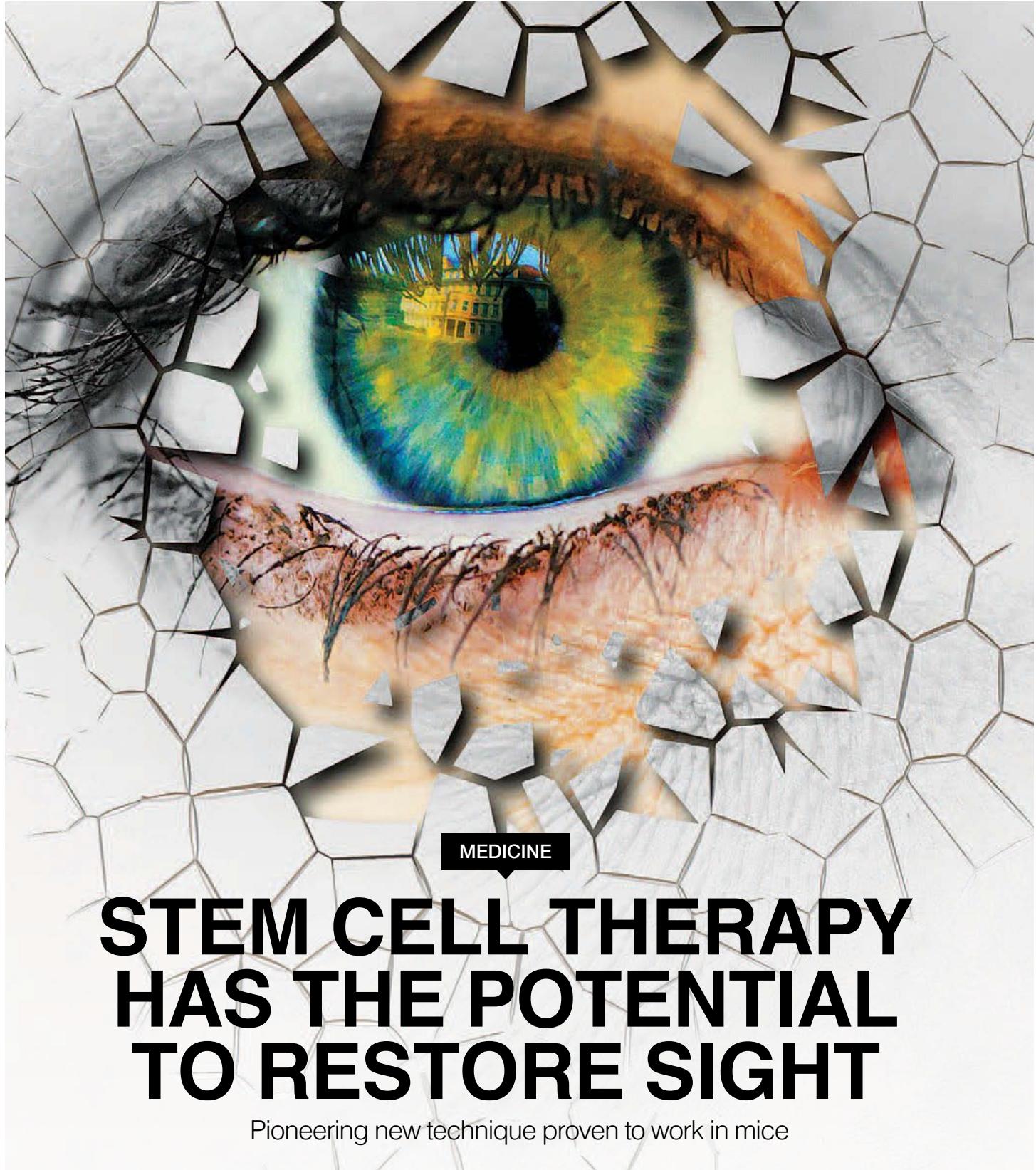
## DUDE, WHERE'S MY CAR?

### CARIBOO

Plug this nifty little device into your car's cigarette lighter, and you'll never forget where you parked your motor again – it's linked to an iOS/Android app that'll show you exactly where you left it. It can also alert you if anyone other than yourself (or another designated driver) attempts to drive your car, can send details of your precise location to friends, and provides statistical feedback on your driving habits (€99; [www.my-cariboo.com](http://www.my-cariboo.com)).

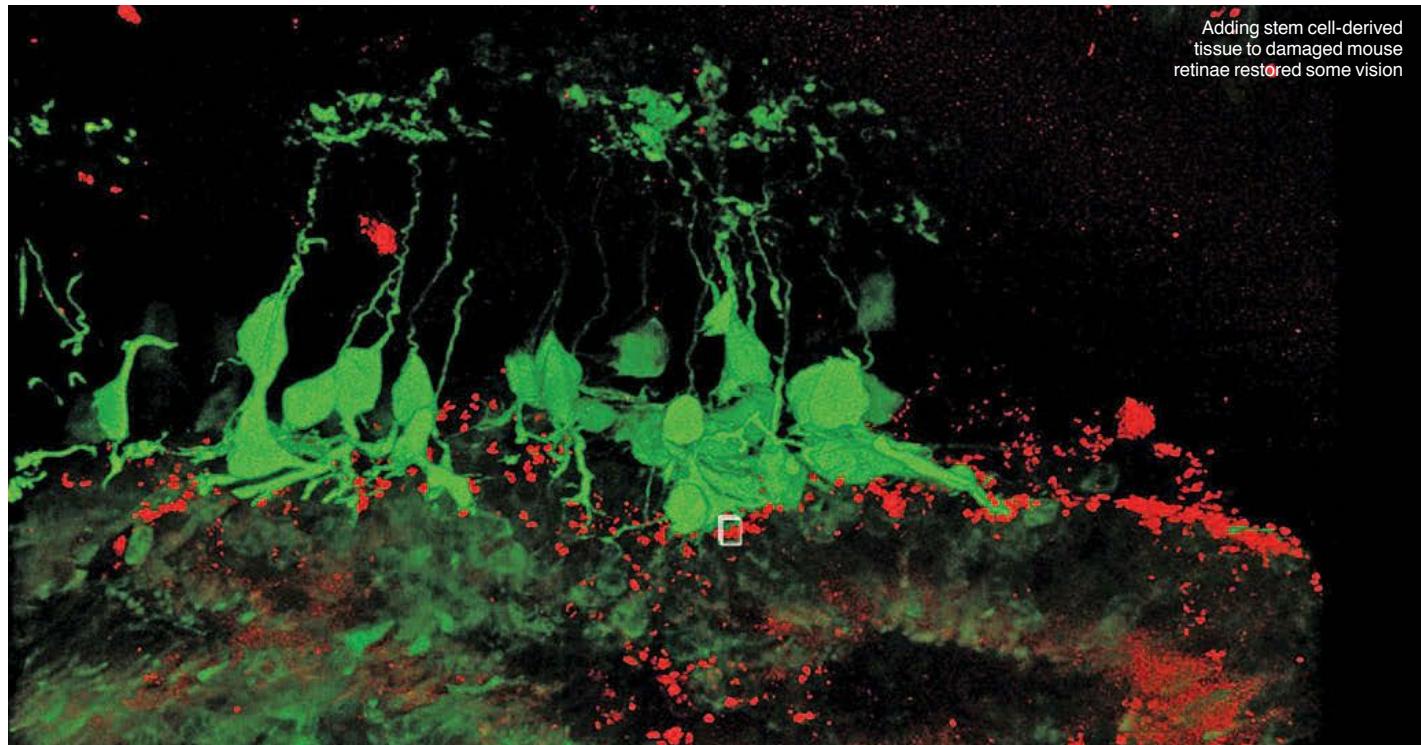


# DISCOVERIES



**STEM CELL THERAPY  
HAS THE POTENTIAL  
TO RESTORE SIGHT**

Pioneering new technique proven to work in mice



**S**AY goodbye to your reading glasses. Researchers at Japan's RIKEN Centre for Developmental Biology have restored vision in mice with end-stage retinal degeneration – the leading cause of irreversible vision loss and blindness in elderly humans – by transplanting retinal tissue grown using stem cells.

Patients with conditions such as age-related macular degeneration and retinitis pigmentosa lose vision as a result of damage to the outer layer of light-sensitive photoreceptor cells in the eye. There is currently no cure for this, only therapies aimed at stopping the progression of vision loss.

The team genetically reprogrammed skin cells taken from adult mice to an embryonic, stem cell-like state, and then converted these into retinal tissue. When transplanted into mice with end-stage retinal degeneration, the stem cell-derived retinal tissue developed to form photoreceptors – specialised neurons within the retina that send vision signals to the brain.

"No one has really shown transplanted stem cell-derived retinal cells responding to light in a straightforward approach, as presented in this study, and we collected data to support that the signal is transmitted to host cells that send signals to the brain," said researcher Michiko Mandai.

When the treated mice were placed in a box consisting of two chambers, with one rigged up

## "VISUAL FUNCTION COULD BE RESTORED TO SOME DEGREE"

to deliver electric shocks through the floor, they were able to see a warning light and avoid the shocks by moving from one chamber to the other. "We showed that visual function could be restored to some degree by transplantation of the stem cell-derived retina," said Mandai. "This means that those who have lost light perception may be able to see a spot or a broader field of light again."

Next up, the researchers will test tissue derived from human stem cells in mice, with the ultimate goal of moving on to clinical trials in humans. "It is still a developing-stage therapy, and one cannot expect to restore practical vision at the moment," said Takahashi. "We will start from the stage of seeing a light or large figure, but hope to restore more substantial vision in the future."

### EXPERT COMMENT

#### PROF ROBERT MACLAREN

Professor of ophthalmology, University of Oxford, the UK

"This study is exciting because it shows that a complicated part of the central nervous system, such as the retina, could potentially be regenerated from something as simple as a skin cell. Furthermore, the engineered retinal tissue appears to be able to make connections to the brain after transplantation.

Clinical treatments are still a long way off, but, for patients with retinal degeneration, this provides some hope for the future."



## NUMBERS

# 3-6 months

The length of time it took to hatch a dinosaur egg, a team from Florida State University has found. This long incubation period, combined with the fact that it took around one year for dinosaurs to mature, could have contributed to their extinction, the researchers say.

# 13,045 km

The distance flown by a male Alaskan sandpiper in just one month in order to mate with as many females as possible, as tracked by a team at the Max Planck Institute for Ornithology, Germany

## MICROBIOLOGY

# Deep-sea microbes may be the missing link in search for origin of complex life

Let us introduce Thor, Loki, Odin and Heimdall – our microbial ancestors dating back two billion years. A team at Uppsala University, Sweden, has discovered several microbes carrying genes that were previously thought to be unique to more complex life forms, including humans.

The single-celled microorganisms, called archaea, were discovered in aquatic sediments collected at seven sites around the world, including hydrothermal vents in the Arctic Ocean and hot springs in Yellowstone National Park. The four species in question, named after Norse gods and known as 'Asgard archaea', are as different from one another as a tree is from a mushroom.

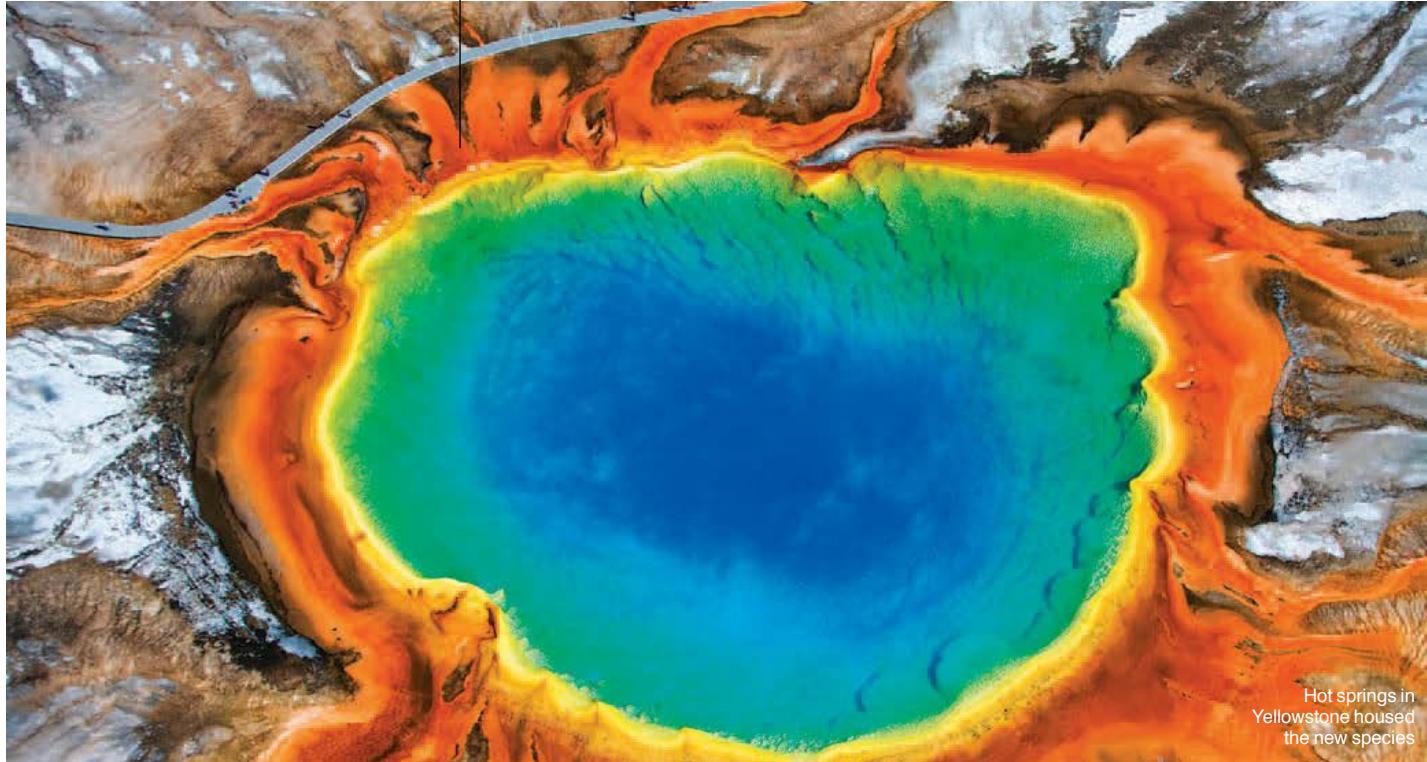
The finding supports a decades-old theory that complex life first arose when an archaeon consumed a bacterium, but the bacterium survived. The resulting arrangement proved to be beneficial to both, and the two previously

separate organisms evolved into life forms with cells and complex internal structures, called eukaryotes. All plants and animals are eukaryotes.

"The things which we thought made a eukaryote a eukaryote, [are what] we're now finding in these new archaea," said researcher Brett Baker. "We're essentially rewriting the textbook on basic biology."

So far, the archaea have only been identified by piecing their genomes together using separate bits of gathered genetic material. The team's next goal is to grow them in the lab.

"It would be great if we could isolate or grow Asgard cells, and study them under the microscope," said Thijs Ettema, a researcher who was involved in the project. "I am convinced that this will reveal more important clues about how complex cells evolved. Ultimately, our microbial ancestry will be uncovered." ▶



## SPACE

## COULD MARTIAN SETTLERS LIVE IN ICE HOUSES?

Step aside, Nanook: NASA has announced a Mars base concept that reinvents the igloo. The variable distance between Mars and Earth means astronauts may have to stay on the surface of the Red Planet for many months. That means living quarters are required to keep the crew safe from wildly varying temperatures and radiation.

Dubbed the Mars Ice Home, the new structure consists of a doughnut-shaped inflatable living area, surrounded by a dome filled with water. This freezes to form a thick wall of ice, providing more than enough protection from the dangerous levels of cosmic rays that bombard the surface of Mars – and, if split into hydrogen and oxygen, the water can double as fuel for the return rocket.

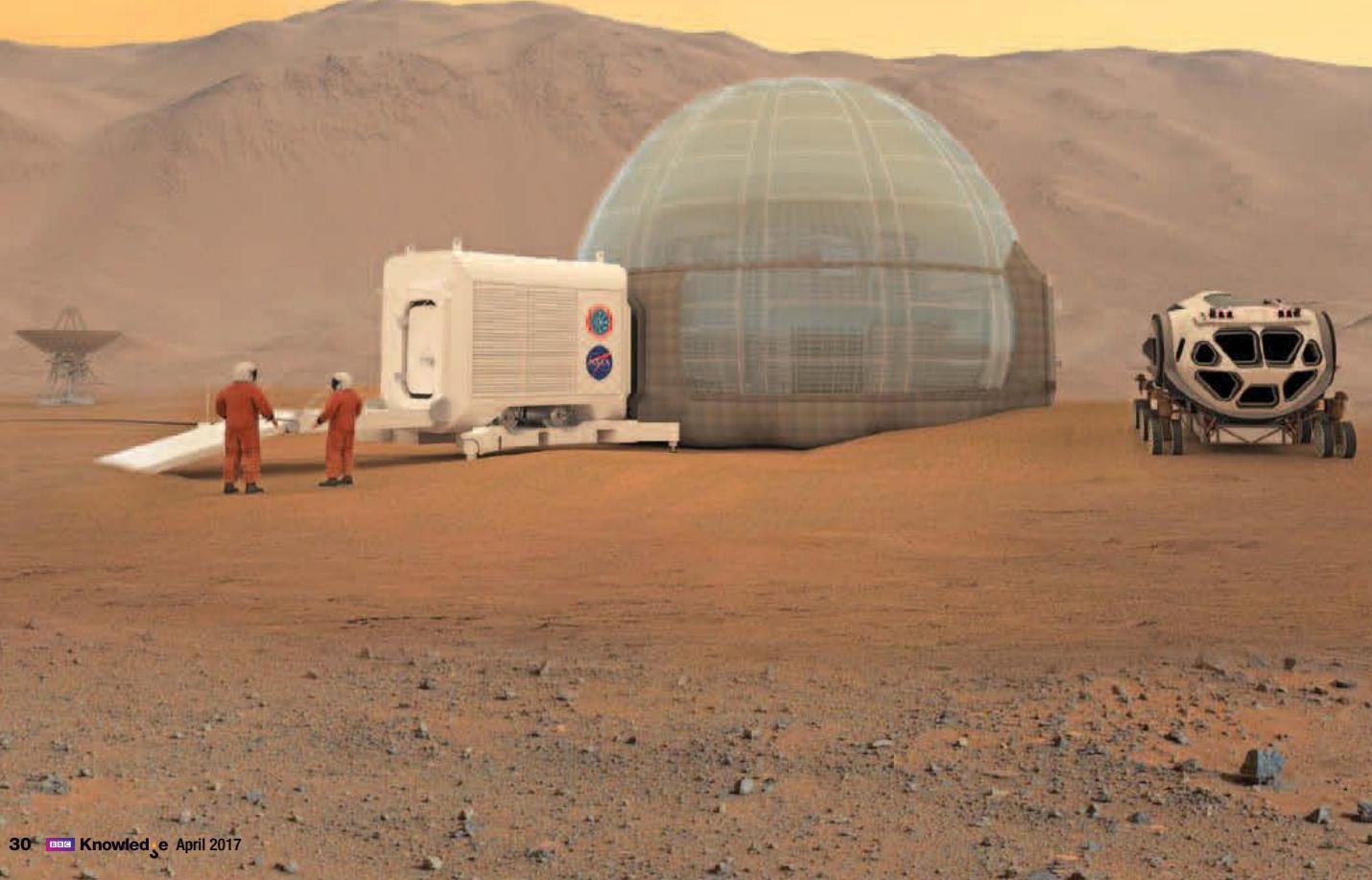
"All of the materials we've selected are translucent,

so some daylight can pass through and make it feel like you're in a home and not a cave," said lead researcher Kevin Kempton.

Because the structure is light plastic, this base would be easy to transport, while the heavy content – the water – could be sourced on Mars. The habitat would be sent ahead of the astronauts and gradually filled from water deposits on the planet. It's estimated that, at a likely cubic metre a day, this would take 400 days.

The Ice Home is just one of the base concepts investigated by NASA's Langley Research Center, holding out the hope of a comfortable stay on Earth's nearest planetary neighbour. ☀

The Mars Ice House is just one of several ideas for constructing temporary shelters for astronauts on possible future Mars missions





# Live in a castle

**Austria's castle-hotels offer the latest  
in unique travel experiences in the world**

A fortress. A stately country manor. An ivy-covered fairytale mansion... Austria's castles are many and you don't have to be a king to live in one. In the last few decades, palaces, castles and manors across Austria have dropped their drawbridges and opened their gates and stately residences to visitors born without the customary royal blood, allowing them to experience life as royalty would.

Since 1450, the **Schloss Fuschl**, in Fuschlsee, with its enchanting and fairytale-like atmosphere, has welcomed guests – aristocrats, archbishops, empresses, and film stars. Romi Schneider shot her film, *Sissi*, here in the 1950s. The four largest suites of the luxury hotel come with special perks – a discreet butler service, a Rolls-Royce for the guests to drive, an award-winning gourmet restaurant to dine in, and a majestic *fin de siècle*-style spa.

Another luxury hotel to spend a vacation feeling like a royal is the **Schloss Velden**. Built in 1607, this beautifully-renovated castle is situated on the western shore of the Wörthersee and is a favourite with guests with a refined taste for luxury and service. The hotel also arranges for a helicopter ride to take guests to an opera night in Vienna or for a romantic dinner in Venice.

Royals value their privacy and the **Schloss Pichlam** fits the requirement for those who want to vacation away from prying eyes. Set within thick walls, the 900-year-old castle overlooking the picturesque Enns Valley has a 18-hole golf course, an Ayurveda wellness centre, an award-winning gourmet kitchen, and historic rooms.

Around 50 of these luxurious properties in Austria are awarded the 'Schlosshotels' association. Each property has something unique to offer, in style, ambience, setting and adventure. The contrast that each hotel offers is delightful – you could have a historical escape with modern amenities such as a wellness centre and spa, a different property to appeal to the modern traveller who likes to soak up the contemporary arts scene, and something else completely for the luxury-seeking aesthete.

There's a castle out there for you.  
Try a castle stay for your next travel experience.



 Austria  
arrive  
and revive

# READ



## When animals take centrestage

### NEW READS

#### FANTASTIC MR FOX

By Roald Dahl

Mr Fox is a clever little fellow. Along with Mrs Fox and their four baby foxes, they live near a 300-year-old tree on a hilltop near farms. Food comes on, the table by snatching the livestock from the farms of Boggs, Bean and Bunce, who are mean, cruel and dim-witted farmers. Tired of the constant thievery of their livestock, the farmers set a trap to capture Mr Fox alive, but manage to just tear off his tail. In hot pursuit to capture him, the trio excavate mounds of dirt and mud, flattening the hillside in the process, and set up a constant vigil to force him out by starvation. Unperturbed by their efforts, Mr Fox hatches a cunning plan to steal food along with other underground creatures, who, too, have been forced to starve due to the actions of Mr Fox. In the end, a veritable and delectable buffet of food and cider is ready to eat for the animals. As for the three farmers, they are still waiting by the foxhole.



WORDS: MOSHITA PRAJAPATI

#### THE TALE OF DESPEREAUX

By Kate DiCamillo

This is a tale about a princess and a knight. But there is a twist, like there is in all tales of yore.

The knight here is a mouse by the name of Despereaux. He has unusually large ears that help him appreciate music and he is particularly fond of tales where the knight rescues and falls in love with a princess. When his friend, the very human Princess Pea, is kidnapped, he puts on his armour, and soldiers on to rescue his princess, while battling enemies and friends who are foes in hiding.

#### PADDINGTON BEAR

By Michael Bond

The first bear on our list arrived at Paddington Station in London from the deepest, darkest areas of Peru. Wearing a blue duffel coat, a red hat and carrying a battered suitcase, Paddington is lost until the kind Brown family finds the note tied to his coat, reading, 'Please look after this bear. Thank you' and temporarily take him to their house. Polite, kindhearted and with a hard stare reserved only for those he disapproves of, Paddington finds himself caught in a series of mishaps around London, often leading to hilarious results, before his Aunty Lucy arrives and takes him in.



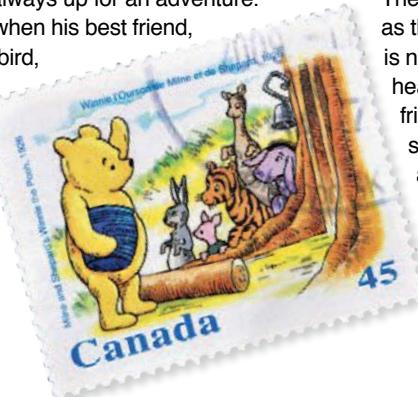
#### STUART LITTLE

By E B White

Stuart Little, a white mouse, lives in New York with his parents, his elder brother George, and Snowbell, the family cat. Though little in size, he has a big heart, and is always up for an adventure.

His biggest adventure comes when his best friend, Margalo, the family-adopted bird, disappears from her roost.

Determined to rescue her, Stuart will not let the fact that he is a mouse get in the way of things, he must bring his best friend home.

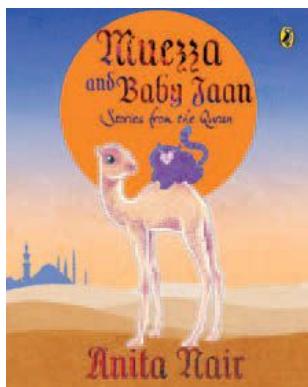


#### WINNIE THE POOH

by A A Milne

The second bear on our list is not as lost as the first. He lives in Hundred Acre Wood, is naïve, kind-hearted and a simpleton at heart but, who occasionally surprises his friends with an unexpected bout of common sense. He loves 'hunny', is a budding poet and has many friends; Christopher and Piglet being his closest pals, followed by Eeyore and Tigger.

Oh, and his name is Pooh.

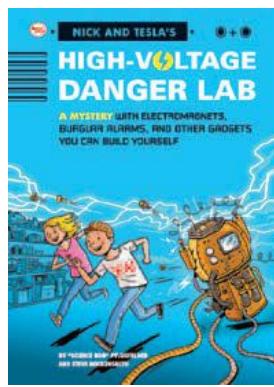


### Muezza with Baby Jaan: Stories from the Quran

by Anita Nair

Penguin Random House India, ₹ 488

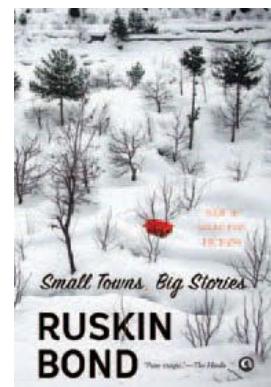
In a book, based on a 13th-century book written by Ibn Kathir, Anita Nair writes to show that the *Quran* is a treasure trove of stories just waiting to be read or read out aloud. Her book revolves around the re-telling of the tales around two narrators: a cat named Muezza and a baby djinn who is a shape-shifter. Muezza, separated from his owner Shahir, is lost in the desert and is discovered by the baby djinn, who takes the form of a camel called Baby Jaan. Together, they form an unlikely friendship as they travel through the desert, with Muezza telling stories from the *Quran*. One of the tales talks about the origins of burial customs in Islam. When Habbil, one of Shahir's sons, dies, Shahir and his other son Qabil are left distraught. They travel with the corpse, not knowing what to do with it, till they come upon a murder of crows. They see how crows dig a hole in the ground to bury their dead and cover them with earth. It is an act that Shahir and Qabil follow.



### Nick And Tesla's High-Voltage Danger Lab: A Mystery with Electromagnets, Burglar Alarms, and Other Gadgets You Can Build Yourself by "Science Bob"

Pflugfelder and Steve Hockensmith  
Quirk Books (Rupa), ₹ 255

Siblings Nick and Tesla are shipped off to their eccentric Uncle Newt's house for their summer vacation. Bored, they take up their uncle's invitation to tinker in his lab. The result: a rocket ship, which launches straight into the house next door with Tesla's locket. Now, of course, the children need to get the rocket and locket back and that is where the mystery begins. Is the house haunted or did Nick just see a pale-looking girl? As the plot progresses, the siblings construct five inventions that the reader can build too, reading the instruction manual published in the book along with a list of tools required. Expect simple illustrations, plot lines following stereotypical tropes, and a mystery-solved ending that should thrill the Scooby gang and fans.



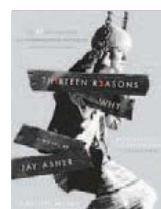
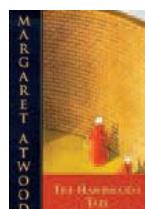
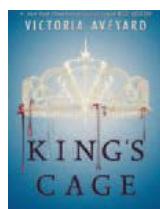
### Small Towns, Big Stories

by Ruskin Bond

Aleph Book Company, ₹ 279

In the preface to this collection of short stories, Ruskin Bond talks about how there is always a tale (fictional or non-fictional) in small towns because "It is easier to know people in small places" and their stories. And what a delightful collection of short stories it is! There are stories of innocence, like *The Big Race*, where three little ones wake up early every Sunday morning to race their pet insects against each other, and of resolute defiance in the face of grief in *The Funeral*. There are biographical mentions in *Bus Stop*, *Piplanagar* or the classic *The Night Train at Deoli*. The irony that is life is beautifully contrasted between Rani Ma and Colonel Jolly in *When The Clock Strikes Thirteen*. *The Visitor*, written in a deceptively simple manner, will definitely leave you with a smile as will *When The Guavas Are Ripe*, a defibrillator for those who have lost hope.

## teen bestseller booklist



1

### KING'S CAGE (B&N EXCLUSIVE EDITION) (RED QUEEN SERIES #3)

by Victoria Aveyard (HarperCollins Publisher)

2

### THE HANDMAID'S TALE

by Margaret Atwood (Knopf Doubleday Publishing Group)

3

### THIRTEEN REASONS WHY

by Jay Asher (Penguin Young Readers Group)

4

### CARAVAL

by Stephanie Garber (Flatiron Books)

5

### CARVE THE MARK

by Veronica Roth (HarperCollins Publisher)

# > CONSOLE WAR <

To the joy of many nostalgic gamers, 2017 will be characterised by the console war. So pick a side, put your blindfolds on, and defend one of these consoles till death does you part

WORDS: NICOLO GOVONI

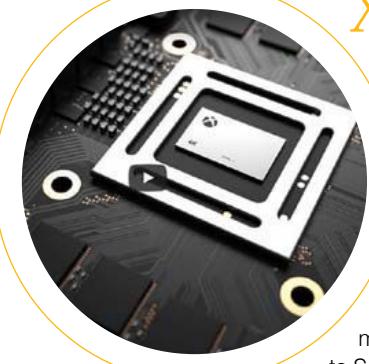
## Nintendo Switch

Unveiled last October and finally presented during a live press conference on 13 January this year, **Nintendo Switch** reflects the company's truest ethos when it comes to its strategy: innovation rather than hardware power. Switch will be the first hybrid console of all times. It's a home console when docked to a TV, and a handheld device otherwise. Its 720p touchscreen tablet can be taken anywhere for a seamless gaming experience on the go. While the competitors count on pixels and frame rate to appeal to tech-heads, Switch will feature what is arguably the most versatile gamepad on the market – the Joy-Con. It will also focus on local rather than online multiplayer, which means real-life gaming with friends wherever, whenever. Another point in favour of Nintendo is the exclusive titles the company is known for *Super Mario Odyssey*, for instance, is expected to be out by the end of 2017. Nintendo Switch launches on 3 March at \$299, along with *The Legend of Zelda: Breath of the Wild*, reportedly the most anticipated title of the year.



Developed by Japanese giant **Sony**, **PlayStation** is currently at its 4<sup>th</sup> generation stage, and has taken over a whopping 53 million households since its debut in 2012. If this weren't enough, last November, the brand-new PlayStation 4 Pro hit the market, boosting core capabilities considerably. Despite the absence of a 4K Blue-ray player, PS4 Pro supports 4K graphics, showcasing a graphic processor twice as powerful as that featured by the original PS4. Additionally, it features 1TB of inbuilt storage size, with a bandwidth of 218 GB/s. This overcomplicated jargon means that Sony's newborn will be a serious threat to its direct competitor Xbox One. That is, unless Microsoft can somehow tackle the assault of what is definitely to be the best-selling console out there. PlayStation 4 Pro is available now for \$399.

## Xbox Project Scorpio



Unlike the PS4 Pro, Microsoft's **Xbox Scorpio** won't simply be an upgrade to Xbox One, but a middle ground between the current console and a full-fledged new hardware. Similar to its competitor, Xbox Scorpio will boast 4K graphics, and, thanks to the partnership with Rift, aims to bring Virtual Reality to the common gamer. Allegedly the most powerful console ever built, Scorpio is the answer to Sony's PS4 Pro. Talking numbers, Scorpio will show off a processor worth 6 teraflops, which will allow a bandwidth of 320 GB/s. In simpler words, it's a true video gaming monster that aims at leaving its competitors in the dust. We know that with great power comes an even greater price; still, although we have nothing but speculation so far, Xbox head Phil Spencer said that Scorpio will fall within the usual console price range, in spite of wielding the specifics of a high-end PC. Xbox Scorpio was unveiled during the 2016 E3 MEANS, and is scheduled for release at the end of 2017.

## PlayStation 4 Pro

# A Gaming LEGEND

**A** hero, a villain, and a princess to be saved. This formula spells out a pure classic, and it's exactly what makes *The Legend of Zelda* one of the most beloved video game franchises of all times, and one of the very few to be over 30 years old.

This March, three decades since his first adventure in 1986, the green-capped hero Link will embark on a boundary-breaking journey to rescue Princess Zelda once again. Only this time, he will redefine the series entirely. Releasing on Nintendo Wii U and Switch on 3 March, *Breath of the Wild*, the 18<sup>th</sup> installment of the saga, will have the player survive the wilderness of an open world in ruins. The numerous trailers released after years of secrecy have taken the Internet by storm, raising the hype among fans with glimpses of the vast kingdom where the latest story is set, with the treasures and foes hiding side by side among its peaks and rivers.

*The Legend of Zelda* is, for many, a solid bet for the best game series ever. Its fandom counts over 60 million enthusiasts, including the late Robin Williams, who famously named his daughter Zelda after the character. So let's take a look at the video game that has won the world over, time and again, with its complex storytelling and constant striving to innovate.

## 1 THE ATMOSPHERE

If you're a child, the kingdom's grim, unsettling atmosphere will make you feel like you're peeking into the obscure world of grown-ups; if you're an adult, you will rediscover the epic sensation of exploring a long-lost fairy tale. No matter who you are, the combination of *The Lord of the Rings* lore and Japanese mythology seems to be the perfect ingredient to touch your hidden soft spot.



## 2 THE INNOVATIVE STREAK

From bending time through the music of an ocarina to sailing an ocean covering a flooded world, from streaking across the sky straddling an oversized bird to frolicking around the dark realm in the guise of a wolf, *The Legend of Zelda* isn't afraid to take risks for the sake of innovation. Every game is conceived as a whole new experience, with the graphic style, the gameplay and even the world itself being redesigned from ground up every five years.

## 3 THE TIMELINE

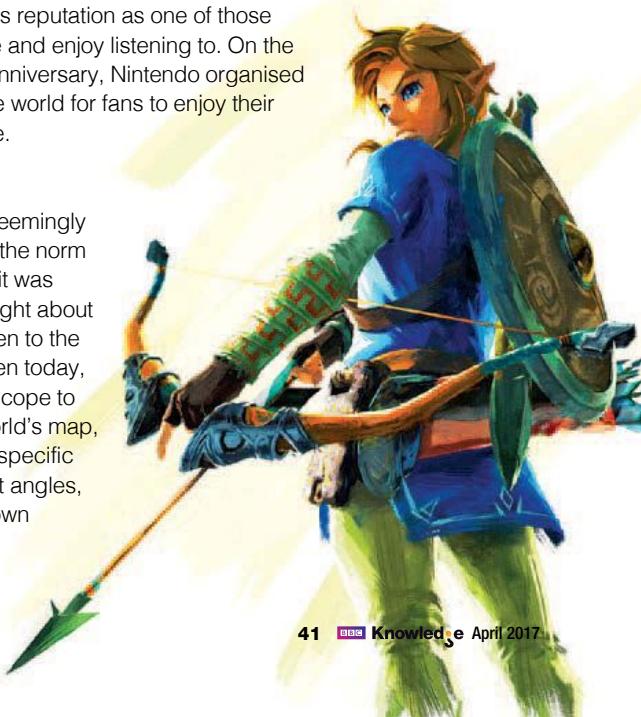
At first, it was a boy wielding a sword to rescue the princess from evil. Things were simpler back then – or were they? Twenty years and a dozen games after the first instalment was released, Nintendo unveiled the series's official timeline, binding together all the games in a coherent chronology, and guess what? The first chapter is actually the last one. The timeline, spanning thousands of years from the creation of the kingdom to its numerous demises, has had gamers cooking up the most riveting theories for decades now.

## 4 THE SOUNDTRACK

Just like great cinema needs a great score, a great video game must feature memorable theme music, and *Zelda* doesn't disappoint on this front. Having picked up more than a few Game Critics Awards for its soundtracks, the franchise's music earned its reputation as one of those games that you can just pause and enjoy listening to. On the occasion of the series's 25th anniversary, Nintendo organised a series of concerts around the world for fans to enjoy their favourite orchestral themes live.

## 5 THE FREEDOM

Meandering around in a seemingly unconstrained world might be the norm today, but, back in the 1990s, it was *The Legend of Zelda* that brought about the first instance of a world open to the player's explorative needs. Even today, the series offers unparalleled scope to delve into the depths of the world's map, allowing the player to tackle a specific plot point from various different angles, essentially dreaming up their own gaming experience.



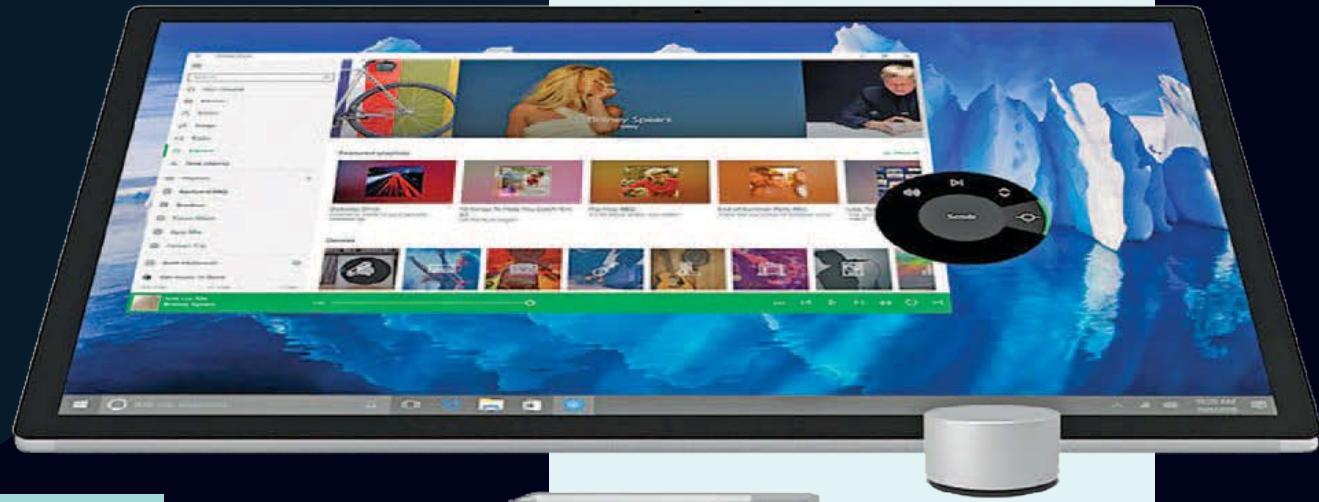
# APPLE VS MICROSOFT (AGAIN!)

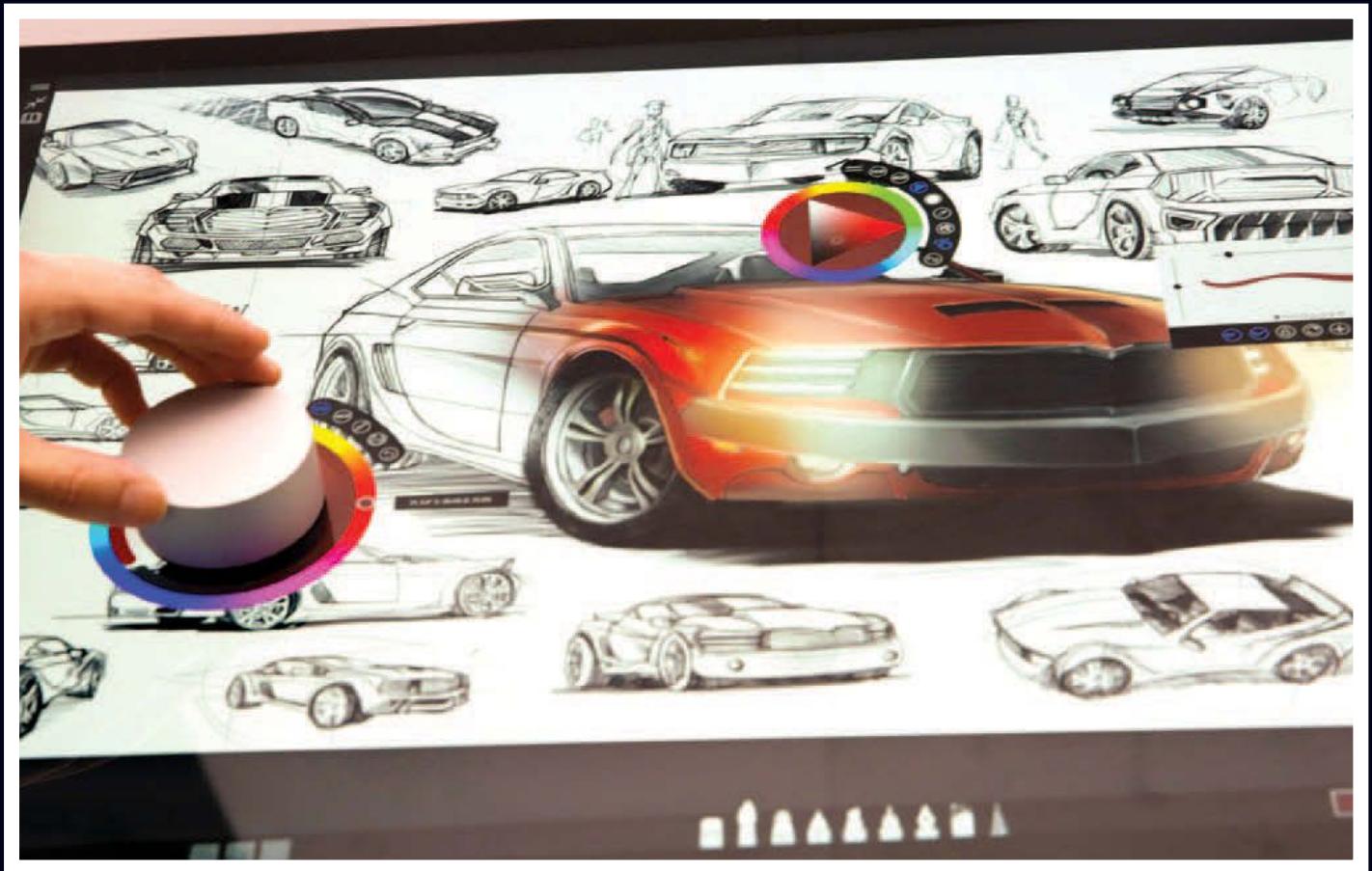
With new flagship machines just announced by both companies, the old rivalry is heating up

Both Apple and Microsoft have launched new flagship computers, in the form of the new MacBook Pro and the Surface Studio. While the two products aren't direct competitors, both sport a number of technological innovations that open up new fronts in the two companies' eternal battle.

In Apple's case, the headline news is the introduction of the new Touch Bar that runs along the top of the keyboard (though this is absent from the entry-level 13-inch model). This touch-sensitive OLED strip replaces the function keys with context-specific buttons and menus that appear depending on what software you're using at the time. It's designed to eliminate the need to remember keyboard shortcuts, and will also show iOS-style Quick Typing suggestions. If you're attached

# NEW TECH ON THE BLOCK





to them, the existing function keys can be made to appear on the strip by pressing the Function key.

Other innovative features on the new MacBook Pro include a power button that doubles as a TouchID sensor, and a much larger trackpad. So far, so good – but there's a rather large 'but' coming.

True to its ongoing obsession with making everything slimmer and lighter, Apple has served up a new MacBook Pro that's almost devoid of ports. There's no MagSafe power port, no HDMI, no Display Port, no SD card slot and no USB – just two USB-C ports on the entry-level 13-inch model, and four on the 15-inch and higher-end 13-inch models.

The result is a machine that's slightly slimmer than its predecessor, but whatever weight you save is likely to be more than made up for by the number of dongles and adaptors you'll need to carry around – each of which also adds to the cost. £10 here or £20 there might not sound a lot, but given that even a midrange 13-inch MacBook Pro costs £1,749, while the top-of-the-range 2.7GHz 15-inch with a 512GB SSD costs a whopping £2,699, having to fork out extra for a pocketful of dongles does smack of adding

insult to injury. We've heard many long-term Mac users – mostly music and design professionals, who've been Apple's core market forever – say they're now considering buying Windows machines for the first time in decades. But Apple's clearly hoping brand loyalty will keep its customers faithful.

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## **When even a midrange 13-inch MacBook Pro costs £1,749, having to fork out extra for a pocketful of dongles adds insult to injury**

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### **TOUCH DIALLING**

Meanwhile over at Microsoft, all eyes are on the new Surface Touch desktop, and the accompanying Surface Dial.

The former is Microsoft's first all-in-one computer and is aimed at creative pros, with a 28-inch touchscreen display that can be tilted to just about any angle – even right back to 20°, at which point you've essentially got a high-tech drawing board. It's a rival to Apple's 27-inch iMac, with the 'basic' model

expected to cost £2,500+ offering a 1TB hybrid solid state/hard disk drive, 8GB of RAM and a 2GB i5 processor. You can have 32GB of RAM, a 2TB drive and an i7 CPU if you want them, but don't expect much change out of £4,000.

As for the Surface Dial, that's perhaps the most interesting new feature of all. The scroll wheel can be user-assigned to whatever software parameters you wish, whether that's adjusting colour levels in an image or simply scrolling through menu options. It costs an extra \$100 (£80 approx), but offers a new level of hands-on control that will appeal to certain types of users, such as music and video producers.

Dial offers haptic feedback, and, if held against the Touch's screen, also brings up default options (such as a colour wheel) at the press of a button.

Tellingly, US buyers are being offered \$650 off the price of a Surface Touch if they trade in their old Mac laptop, which seems to confirm that Microsoft has its eyes firmly on Apple's core user base of creative professionals. As we said at the start, the old rivalry doesn't look like cooling any time soon...

# NEWS FROM THE WORLD OF TRAVEL & FOOD

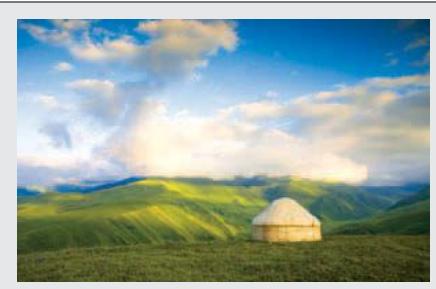
## INFO NUGGETS FROM ACROSS THE GLOBE

### PARIS, FRANCE



Parisian authorities have long been worried about the strain the weight thousands of **love locks** were putting on bridges across the River Seine. Now, these locks are being sold to the public to raise money for refugees. Paris, once again, proves why it is called the City of Love.

### KAZAKHSTAN



Because it does not have a coastline, **Kazakhstan** has what is called a 'landlocked navy'. Although the country borders the Caspian Sea, it does not connect to the sea by a natural waterway.

### NAGOYA, JAPAN



With its white curved walls and jade green roof tiles, **Nagoya Castle** is one of the finest examples of a Samurai castle. It also has an inner and outer moat.

### BRITAIN



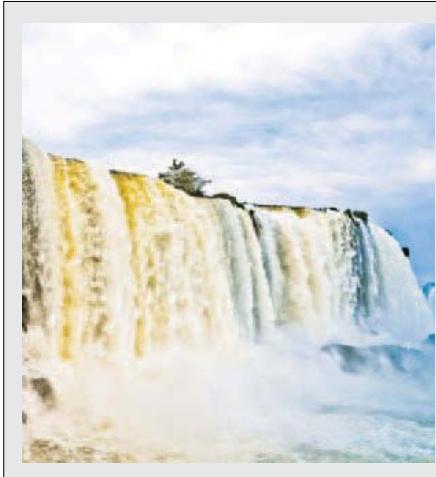
Some of Britain's iconic red **telephone boxes** have been repurposed as honour libraries, salad stands, coffee shops, even first-aid booths – complete with defibrillators. Mobile charging stations coming soon!

### TIBET



Don't feel offended if someone in Tibet **sticks his or her tongue out at you**. In Tibet, it is a way of greeting and also a show of respect.

### ARGENTINA & BRAZIL



Stretching across 2.7km, Argentina and Brazil's gushing **Iguazu Falls** is made up of 275 waterfalls. It is the largest waterfalls system in the world.



## 5 GREAT-TO-KNOW FACTS ABOUT THE NORTHERN LIGHTS

- The northern lights are also termed the Aurora Borealis, named after the Roman goddess of the dawn (Aurora) and the northerly winds (borealis).
- They are caused when charged particles from the sun are magnetically deflected to the Earth's polar regions, releasing light as they collide with the atmosphere – resulting in a fireworks-like display across the winter sky.
- The best places to see the northern lights fall at latitudes north of 60° N, on clear, cloudless nights between September and April. These include spots in northern Sweden, Norway, Finland,

Iceland, Russia, Alaska and Canada, and, sometimes, Scotland.

- The northern lights have had their place in history and mythology. Viking sailors are reported to have thought they were the Valkyries (Odin's fair maidens) galloping across the heavens. To the Inuit, the lights represented the spirits of friends and family in the next life.
- Increase your chances of seeing the aurora by picking a clear, starry night, and a good vantage point like a lakeside or hilltop. Head away from urban areas to reduce the risk of pollution hindering your view. And, of course, ask your hotel reception desk to wake you if the lights appear.

### TRAVEL WITH FOOD



#### Spotted Dick, Britain



Despite the intriguing name, there is nothing giggle-worthy about spotted dick – it's just an Old School British dessert, a fruity steamed pudding traditionally made with suet, citrus zest and currants, and served with hot custard. It used to be so much a part of the British dinner menu that it also found mention in Charles Dickens's *A Christmas Carol*.

# SNAPSHOTS

## Eye candy

ZHENGZHOU PROVINCE,  
CHINA

**Motorists driving through the outskirts of Zhengzhou, China, may find themselves dazzled by a flashy new addition: a motorway tunnel that's as bright as a bag of Skittles.**

The 400m underpass opened in January and features multicoloured stripes throughout. While there is no doubt that it looks incredible, the spectrum of colours serves a serious scientific purpose: it helps drivers' eyes adjust to the changing light as they enter and exit the tunnel.

"Our eyes are better at seeing bluer colours in dim light," explains Ananth Viswanathan, consultant ophthalmologist at Moorfields Eye Hospital, Dubai, UAE.

"This is because our eyes have two main types of light-sensitive cells – cones for bright light and rods for dim light. The cone system is better at longer red wavelengths, whereas the rod system is better at shorter blue wavelengths.

"Having bluer colours in the central dimmer section of the tunnel makes sense as colour vision changes at different light levels," he adds.









## Going with the flow

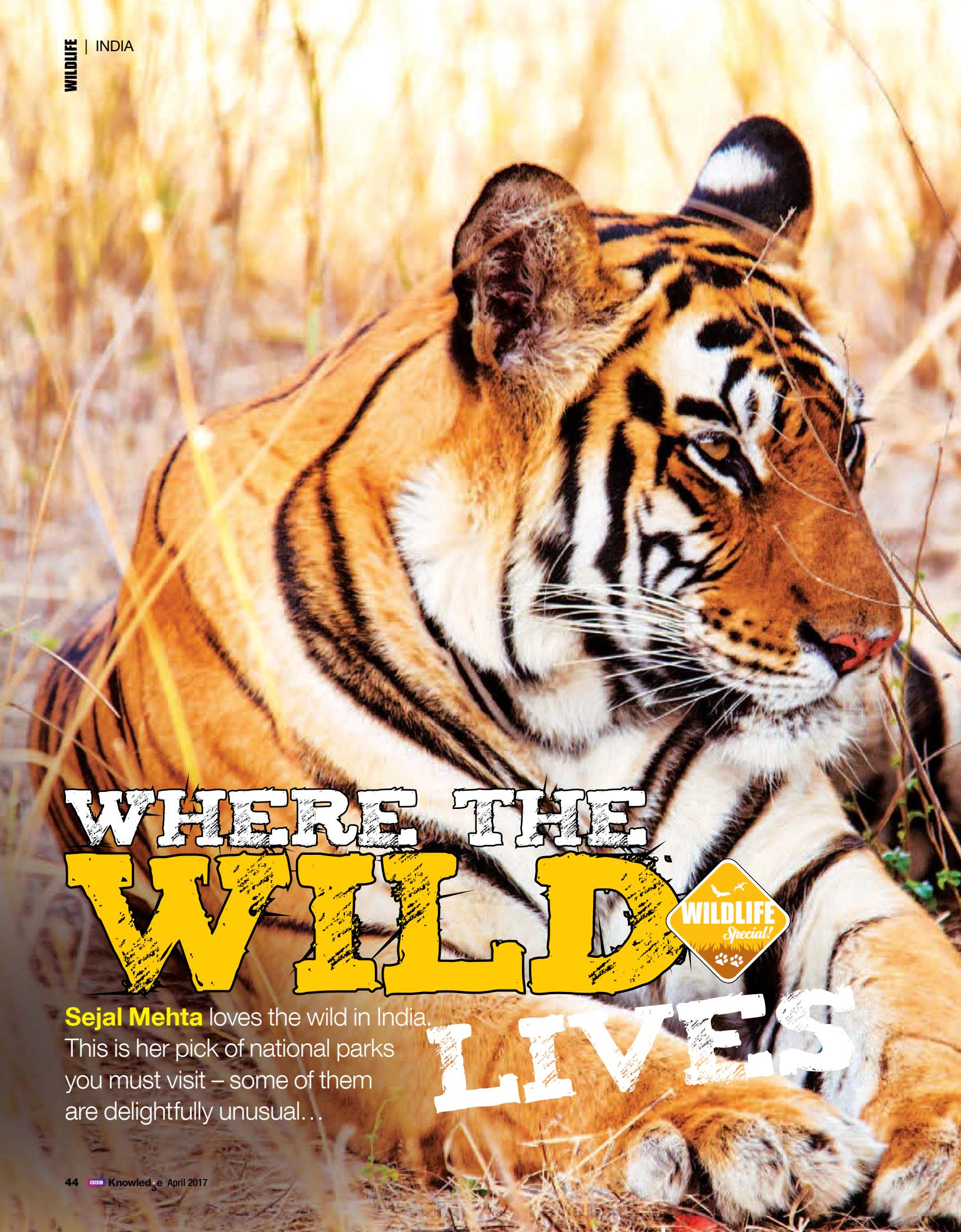
MOUNT KILAUEA, HAWAII  
USA

Now this really is a hot shot, the gently glowing lava flows of Mount Kilauea volcano, Hawaii, are capped by the faint streak of a shooting star, the sprawling majesty of the Milky Way and a gleaming full Moon.

“What’s special about the volcanoes of Hawaii is that they sit on a giant hotspot, which is the origin of the very islands themselves,” says Prof Dougal Jerram, a volcano expert and BBC presenter. “A hot plume of material from deep within the Earth feeds the volcano, and as the Pacific plate slowly moves over this hot spot you get the chain of Islands that form the Hawaiian archipelago.”

Mount Kilauea is the most active volcano on Earth – its current eruption has lasted for more than 30 years. Its gently sloping landscape means that the incandescent lobes of lava that it produces are slow-moving but expansive.

“Each lobe breaks out from a previous one and flows like hot treacle, making a characteristic folded, rope-like texture on the surface, which is named by an Hawaiian word ‘pahoehoe’,” says Jerram.



# WHERE THE WILD LIVES

**Sejal Mehta** loves the wild in India.  
This is her pick of national parks  
you must visit – some of them  
are delightfully unusual...



OVER the last decade, I've travelled extensively in India's wild spaces, from the Himalayan National Park with its alpine vegetation in the north, to the wet rainforests of Agumbe in the south. The remarkable thing about India's natural landscape is its diverse ecosystems, all in one place: rainforests, scrublands, river sanctuaries, islands, deserts... I've started to see these places not as destinations, but as homes, with their own history and stories of survival. It's downright impossible to pick which places you should travel to. This piece, then, is just a place to begin. Start with these and go on to explore the tremendous ecosystems that this country hosts.



### THE CENTRAL INDIAN TRIO IN MADHYA PRADESH

Go for: Jeep safaris, big cats, birding

This is the heart of tiger country. Madhya Pradesh hosts three of the most popular names in wildlife tourism: Pench, Kanha, Bandhavgarh, sitting side by side. They're on this list together so you can put more than one on your itinerary. The landscape is similar across these forests. Sal and teak trees dominate the central Indian landscape and much of Kipling's *Jungle Book* is set in Pench, not Kanha, as many believe. While driving through Pench, you'll see how the large grey boulders, stacked up against each other, could so easily be Bagheera's perch, and how the numerous rocky plateaus could host important wolf council meetings. But Shere Khan is surprisingly sociable here. Collarwali, a radio-collared tigress, is a favourite with photographers and tourists. She seems unfazed by attention and regularly emerges for sightings with her cubs. Unlike in the south, this familiarity with and affection for certain tigers is extensive in the forests of central and northern India. While some think this encourages a fondness for the animals, others see it as a danger to the cats and other species, escalating one animal's brand over that of the forest, even in a poacher's eyes. Whichever way you see it, some of these animals have achieved cult status. Bandhavgarh, which is still one of the most popular parks in the country, was an even stronger magnet for tourism years ago, with stories about the mighty Bamera, Kankati and Charger delighting travellers.

To me, Bandhavgarh means none of those things, but an opportunity to work and volunteer in conservation in the context of the communities that stay around the forest. Instead of just sitting in a jeep and zipping through the forest, it's more enriching to find opportunities to engage in upkeep, awareness programmes and constructive tourism. In national parks like these, make time to walk on nature trails, observe smaller animals, especially those that aren't as charismatic as the big cats, converse with people you meet, use travel as a way to understand our tourism spaces and how you can contribute.

And do enjoy these forests. The tiger is just one resident of this ecosystem. Pay attention to the landscape, observe how it changes as you move between zones. By the time you hit the famed Kanha meadows, you will have seen many chitals already, but wait and observe as the sun rises over these grasslands, bathing the landscape in a warm glow, illuminating herds of deer, langurs, and so many hidden creatures.

### GETTING THERE

BY AIR: Both Nagpur (better for Pench and Kanha) and Jabalpur (for Bandhavgarh) have airports with a good flight frequency.

BY RAIL: Nagpur, Katni and Umaria are railheads on this route.

BY ROAD: From Nagpur, Pench is closest at 90km, then Kanha (at 260km). It is better to drive to Bandhavgarh from Jabalpur (190km).

**BEST TIME TO VISIT:** March to May, when the intense heat brings the cats to the waterholes, is a good time for sightings. The parks are closed in the monsoon. ▶



## AGUMBE, KARNATAKA

Excellent for: Watching snakes

The King lay a mere eight feet away. The sky was full of stars, the cicadas were carrying on a spirited symphony and the darkness of the night was being battled only by the glow from our torches. There he lay coiled, a 10- to 12-foot King Cobra.

Now, while we come to terms with the fact that this was one of the most venomous snakes in the country, let me supply some context to this night.

I was on a night walk with researchers from the ARRS (Agumbe Rainforest Research Station), on a story for *Lonely Planet Magazine India*. I was expecting to see nothing, well, apart from a vine snake or two, and some interesting insects. At best, I was hoping to see a slender loris, with its googly eyes, scorpions or a flying squirrel – all of which I did see. I was not expecting to see the King; it doesn't happen that easily. People stay for weeks, months without seeing one. I know of travellers having made repeat trips, unsuccessfully, to see a King in the wild.

This was truly a blessing from the gods. Agumbe is a part of the Western Ghats

in Karnataka, and home to the ARRS, a conservation and research initiative started by Romulus Whitaker, to study and document species in the Agumbe region, especially the King Cobra. When I visited, almost five years ago, they were conducting the first-of-its-kind telemetry project on these magnificent snakes. Field visits revealed further gems, a krait that slithered past us less than five feet away, on the other side of a mesh fence, a Malabar pit viper just outside the lavatory, a hump-nosed pit viper coiled near a stream...

Water lies at the heart of Agumbe's allure. The weather is tropical and humid, ensuring torrential rain that refuses to go quietly. To see the forest during and after the monsoon is to see it covered in a shade of green you've never seen before. Wildlife photographer and researcher Tasneem Khan writes about the Agumbe monsoon in this beautiful manner: "At first, the thirsty laterite soil seems to absorb every drop of water, but the rain is incessant... Soon, every little ditch, depression and trench is converted into a water body. Rivulets course through plantations and forests, rapidly feeding these streams and rivers. As the rivers begin to flow, they set in motion countless processes of revival, birth, growth, life and death."

I suggest you explore the forest around ARRS, and spend time understanding the habitat, but, if you do want to venture out, there are a few places to visit: the touristy Sunset Point, Jogigundi Falls, Kundadri Hills. Incidentally, Agumbe is where *Malgudi Days* was shot, and the old house, Dodda Mane, where everyone's beloved Swami stayed in, is alive and well, and open to tourists.

### GETTING THERE

**BY AIR:** Mangalore Airport is 110km away.

**BY RAIL:** Udupi (55km away) is the closest railway station. You can also alight at Shimoga (90km).

**BY ROAD:** A direct KSTRC bus service runs between Agumbe and Bangalore daily. Buses ply every 20 minutes from Mangalore to Shimoga that pass via Agumbe.

### STAY:

There aren't too many places to stay at in Agumbe. If you want to enjoy the forest and avail of in-house expertise, these two are your best bets.

**AGUMBE RAINFOREST RESEARCH STATION (ARRS):** write to them at [arrs.india@gmail.com](mailto:arrs.india@gmail.com)

**KALINGA ACRE:** Visit [www.kalingacre.com](http://www.kalingacre.com) for more details.



## KALI TIGER RESERVE, KARNATAKA

Excellent for: Birding, crocs and the elusive Black Panther

Some afternoons are just different. They aren't spent working, or reading, but in a coracle in the middle of a croc-infested river in Dandeli, a small town in Karnataka.

The River Kali is known to be moody; she's tempestuous in some places and serene in others. This particular stretch was calm, making it appropriate to go looking for crocodiles. The coracle navigated the river with ease, its roundness ensuring maximum proximity to everything, while rowing close to the banks to look for basking reptiles or battling mid-river currents. For a while, we enjoyed the lazy turns as we floated along, combing the area, and then, finally, we met one – a young male, resting close to the shore. The boatman took us close to him, right until we were almost at touching

distance. The feisty male splashed his tail and disappeared under the water wildly rocking our tiny boat (and our hearts).

If you don't particularly fancy getting into the water, you can keep an eye on Crocodile Island from a watchtower at the Jungle Lodges & Resorts property, where, at certain times in the day, you can see them sprawled over, basking, sleeping, basically enjoying all the attention and the hospitality. This is also the best spot to watch birds from.

If you aren't a birder, there's an excellent chance Dandeli will make one of you. Mornings are filled with birdsong, which is loud and melodious enough to wake you. Hornbills, Malabar Whistling Thrushes, Brahminy Kites, Asian Paradise Flycatchers, the gorgeous

Malabar Trogons; the list is quite long.

If you'd like to take a safari, spend mornings and evenings at the Anshi-Dandeli Tiger Reserve (now called Kali Tiger Reserve), which is part of the Dandeli Wildlife Sanctuary. Two tribes, Gowlis, a herding

community, and the Siddhis share this teak and rosewood forest with the wildlife. There's also evidence of mining at Shilori Peak before the ban in the 1990s. There are big cats in this reserve, so there's a chance you'll meet the tiger, or the leopard, or if you're truly lucky, the melanistic leopard, popularly called the Black Panther. If that isn't incentive enough...

### GETTING THERE

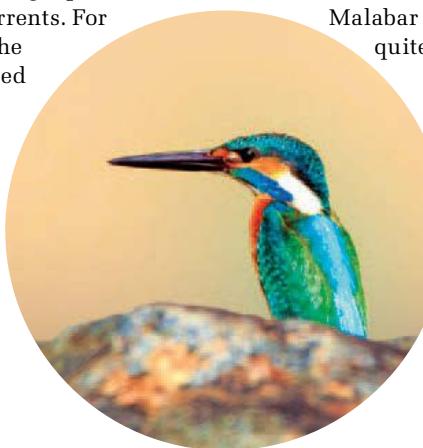
BY AIR: Belgaum Airport is approximately 90km away.

BY RAIL: Belgaum is more convenient and better connected. You can also take the Hubli Exp from Belgaum to Londa and take a taxi from there to Dandeli.

BY ROAD: Belgaum to Dandeli via NH748 and the Mirjan-Ramnagar Road.

### STAY

While Dandeli has enough options to stay at, you can do the three-hour jeep safari only if you're staying on a Jungle Lodges and Resorts (JLR) property. Otherwise, there's an hour's ride in the forest for travellers staying in other hotels. JLR has two gorgeous properties here: KALI ADVENTURE CAMP and THE OLD MAGAZINE House. Visit [www.junglelodges.com](http://www.junglelodges.com) for more details. ▶







## EAGLENEST WILDLIFE SANCTUARY/ PAKKE TIGER RESERVE, ARUNACHAL PRADESH

Excellent for: Birding

I heard them before I saw them – the sound of large wings beating the air.

As we looked up, two Great Hornbills flew out from a tree and flew together, high above our upturned faces. I caught a glimpse of their majestic casques (helmets) before they disappeared into the distance, a mere memory of yellow, white and black.

For a few seconds, no one spoke, and then there was jubilation in the vehicle, complete with a round of silenced high-fives – this was a forest, after all, in the middle of Pakke Tiger Reserve. The Great Hornbill was, for most of us, a lifer, as they say in birding circles, a term used when you see a bird for the first time. I wasn't much of a birder then – or even now – but I was rendered speechless at the sighting.

I will never forget that sound, and how gracefully they sliced through the air despite their enormous size.

As I learned more about them, I realised they are not endemic to these parts; you can spot them just as easily in the Western Ghats, it's the three other species of hornbills found here – Rufous-necked, Wreathed, and the Oriental-pied – that are far more difficult to spot. Pakke is thus also the site chosen for the annual Pakke Paga Festival (Paga meaning Hornbill) that is usually celebrated in January. The 860sqkm reserve is an excellent birding spot, with many endemic species found here.

The forests of the Northeast are different than any other you've visited in India. It's in the way the air is pure and clear at that height. Or in the way trees fill the mountain slopes – as if fighting for space – so all you can see as you drive up the winding, narrow roads are thousands of canopies of varying green clustered close together. Or in the way that the jungle seems truly wild in comparison to the slightly managed forests on regular tourism circuits.

Eaglenest Wildlife Sanctuary in Arunachal Pradesh is a revelation.

I was part of a conservation initiative where familiarisation wildlife camps were conducted at Eaglenest with school children. The sheer volume of biodiversity astounded everyone, not just the kids. There are at least 450 species of birds (if not more) found here, including the Beautiful Nuthatch, a birding favourite, the extremely strange and entertaining Wallcreeper, and the rare Bugun Liocichla, first spotted in 2006 but now almost extinct, with only 20 individuals left in the wild. The drive through the sanctuary is a bumpy one, but you won't notice that, really, not with the different species of bamboo thickets that change with elevations, and the anticipation (and worry) of spotting a wild tusker, or a Red Panda or a Clouded Leopard on the route. Nothing comes easy, though, at Eaglenest; it's remote, it has limited accommodation and the species are tough to spot. But the views every morning, and the untamed heart of this forest make it all worthwhile.

### GETTING THERE

BY AIR: Guwahati Airport is 320km away.

BY RAIL: Guwahati is the nearest railhead.

BY ROAD: It's best to get to Guwahati and make your way on from there.

### STAY

There are just two places to stay, both are campsites with basic facilities.

LAMA CAMP, run by the Bugun tribe: call 00-91-94362-51508 or write to phuarung@gmail.com.

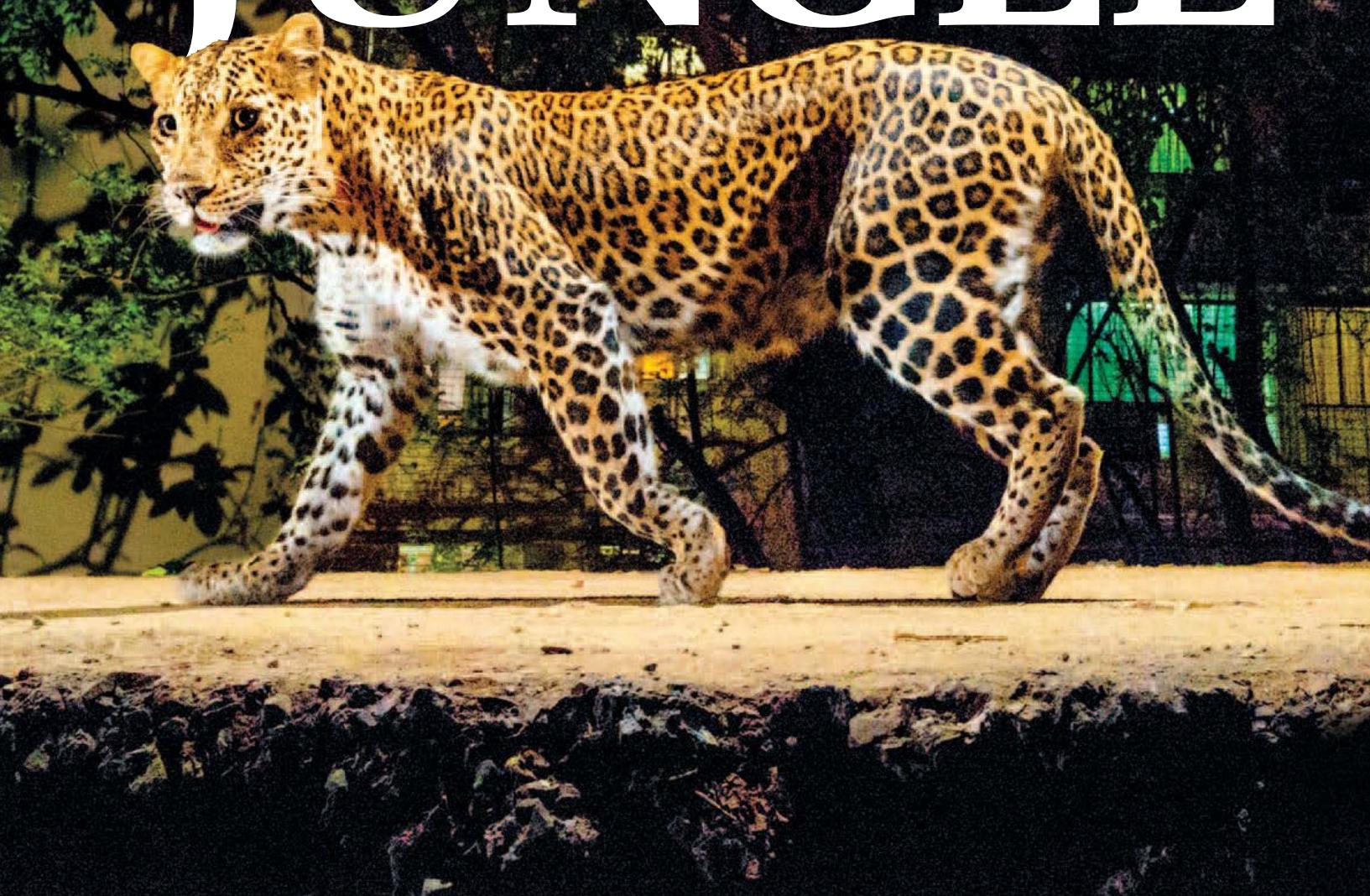
BHOMPU CAMP, run by the Shertukpen tribe: <http://eaglenestbirding.com/bompu-camp/>

**BEST TIME TO VISIT:** If you're interested in reptiles, visit during or the monsoon; otherwise October is a good time to see birdlife and still be able to see reptiles. It gets very cold after that. ☀

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Sejal Mehta is a writer, editor and content consultant. An old travel hack, with a self-confessed bias towards forests, she is currently the editor-in-chief at Nature Focus ([natureinfocus.in](http://natureinfocus.in)). She tweets as @snaggletooth\_00 and is on Instagram as @snaggletooth00

# WELCOME TO THE JUNGLE





As our cities grow, animals are having to carve out a niche in this most human of habitats.

**Fredi Devas**, producer of the urban episode of *Planet Earth II*, spent four years getting to know these metropolitan pioneers



Our planet's human population is booming, making the urban environment the fastest growing habitat on Earth. Animals living in or near cities have to cope with constant movement and change. Yet our bustling streets also offer rich bounties in the form of food, shelter, and warmth.

For *Planet Earth II*, I spent almost four years making a film on urban wildlife. What excited me so much was exploring the surprising new ways in which animals are overcoming the challenges of living in human habitats, carving out a home in these alien worlds.

## Leopards in Mumbai

When we set out to film leopards in Mumbai, India, we were hoping to capture them hunting, but, in the backs of our minds, we were questioning whether we would even see one. Film crews have tried before and only captured glimpses of this highly elusive cat. For any large carnivore to survive in the urban jungle, it has to keep to the shadows, and leopards are known for their stealth.

To give him the best chance of spotting a leopard, our cameraman Gordon Buchanan was equipped with a thermal camera, which he used to scan the horizon for warm-blooded animals out at night. This area of Mumbai does, in fact, have the highest concentration of leopards anywhere in the world. During the day, they sleep in a forested park. When night falls, they head into the streets to hunt for domesticated animals (such as dogs and pigs) that make up a large proportion of their prey.

With the thermal camera and a good deal of luck, Gordon was able to capture remarkable footage of urban leopards hunting. But what amazed him most was to see just how close to people they roamed. ▶



## Hyenas in Harar

When I heard about spotted hyenas freely running through the streets of Harar, Ethiopia, I couldn't quite believe it. The story goes that over 400 years ago, when the city walls were being built, 'hyena gates' were incorporated... not big enough to allow in an opposing army, but just right for a hyena. Now, two hyena clans enter the city through these gates every single night in search of bones left out by the town butchers.

While walking down a narrow cobbled street on my first night in the old town, I held my breath as eight hyenas walked past me, brushing my leg. A few nights later, I filmed the two dominant hyena clans fighting over access to the city. Over a hundred hyenas were battling around my feet, and somehow my fear had disappeared. The peaceful pact between humans and hyenas in this city was so evident that I didn't feel in danger.

I am told that inside the city walls the hyenas never attack people or livestock. But why are they welcomed here, when elsewhere on the planet they are vilified? It's because Harar's inhabitants believe that, each time the hyenas cackle, they are gobbling up a bad spirit in the street. It's a truly remarkable example of how humans and beasts can live alongside one another harmoniously.

## Bowerbird bling Down Under

Filming great bowerbirds in Townsville, Australia, was a particularly enjoyable endeavour. These are highly intelligent birds, full of character and each with their own distinct aesthetic. For them, the city is a treasure chest of brightly-coloured objects that they can collect and decorate their bowers with. Their hope is that all this bling will impress a female.

We first had to find our character. We were looking for an old male (they can live to 25 years old), as these tend to have the most impressive bowers. They also tend to be the biggest thieves! The birds prefer to steal from neighbouring bowers than search for their own objects within the city. Indeed, bower-crime is higher in the urban environment than in the neighbouring countryside. Perhaps there are just too many alluring objects to acquire. These thieves are particularly keen on synthetic objects because they tend to hold their colour and do not perish in the sunshine.

It's amusing and fascinating watching the birds spend two hours every day meticulously rearranging the objects in their bower. But the real entertainment begins when a female arrives. Then, the bower entrance becomes the male's stage, and his dance can begin. ▶





## Metro monkeys in Jodhpur

It was a thrilling moment photographing this female Hanuman langur leaping with her baby across a six-metre gap, four storeys high, in Jodhpur, India.

Each morning, we watched a group of 15 bachelor males pile into the heart of the 'blue city' to challenge the resident alpha male for his territory. The alpha would often have to chase the bachelors for over a mile across the rooftops. The reason that this area is so highly contested is because it's perhaps one of the best langur territories in the world. Hindus associate these primates with the monkey god Hanuman, and revere them. In the temple gardens, they're given all the food they can eat. The alpha male has sole mating rights with the adult females in his troop and, because of their energy-rich diet, they are more fertile than the Hanuman langurs found in neighbouring forests.

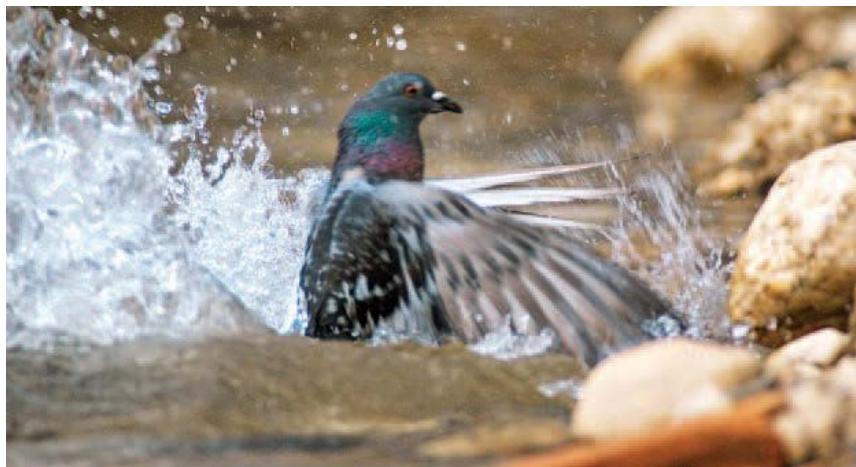
What struck me on this shoot was just how generous the Indian people are towards wildlife living in their cities. The reward for them is being surrounded by wonderful animals.

## Crafty raccoons in the USA

Raccoons are doing incredibly well in North American cities. They are well adapted to finding food in the concrete jungle, and, by being active at night, they avoid contact with humans. They can squeeze through small gaps, and have incredibly dextrous hands. They are also the perfect size for accessing rubbish bins or opening shed doors. If you're too big you are easily noticed, and that's why we see medium-sized scavengers, such as raccoons and foxes, doing so well in our cities.

For me, the most remarkable thing about urban raccoons is that they are better at solving problems than their country cousins. A recent study showed that they are willing to invest more time in trying different techniques to access food, perhaps because the rewards in the city can be so rich. The team saw this on the shoot when they observed a mother raccoon come back three nights in a row to try to get into a bird feeder filled with nuts. It was only on the third night that she succeeded, but it was worth it!





## Bird-eating fish in France

It was a huge surprise to hear of a fish catching and eating a bird – it's usually the other way round! The wels catfish tends to feed on invertebrates and smaller fish, but, in one place in Albi, in the south of France, it has developed a taste for pigeon.

Next to a 1,000-year-old bridge in this city is a 'No fishing' sign. For this reason, catfish are found in enormous numbers, and they grow up to 2.4 metres in length. By the end of summer, there are not many fish left for them to eat. So, in the last 15 years, some of them have turned their attention to catching pigeons instead.

As the pigeons bathe, oil from their feathers starts to flow downstream, and the catfish detect the smell. It's an eerie sight seeing this river monster swim towards a group of birds splashing in the shallows. When a fish strikes, you can hear a loud sucking noise – rather like something disappearing up the vacuum cleaner – as it slurps the bird into its mouth.

## Opportunist geckos in Hong Kong

The invention of the incandescent light bulb just 140 years ago changed our night skies forever, and nowhere more so than in cities. For many animals, artificial light creates confusion. Moths have evolved to navigate by flying at a constant angle relative to a distant light source: the Moon. That's why they're often found flying round and round street lights. But one animal is taking full advantage of these confused insects.

This tokay gecko was photographed in Hong Kong. Hong Kong has a great deal of light pollution, with one of the brightest night skies in the world. As the tokay gecko is a nocturnal lizard, you wouldn't imagine that its eyes could cope with such bright light, but their vertical slit pupils allow them to see in a far greater range of light conditions than we can. The tiny slit only lets in a small amount of light when under a bright bulb, but opens wide in the dark.

The other feature that makes tokay geckos so well adapted to the urban environment is their phenomenal grip. Each foot is lined with half a million microscopic hairs, so tiny that they form a molecular bond with the surface, almost like atomic-scale Velcro. Having evolved to walk on wet leaves in the rainforest, their feet stick well to metal and glass, making this lamp post an ideal place to dine! ●

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Fredi Devas has also worked on *Frozen Planet* and *Wild Arabia*.





# SAVING THE GHOST OF THE MOUNTAIN

**Dr Charudutt Mishra and Matthias Fiechter** of the Snow Leopard Trust tell the story of Anu the snow leopard in Mongolia's Tost Mountains. Along the way, there are camera traps, heart-stopping moments, despair and hope. The Ghost of the Mountain captivates

**T**HE snow leopard roams the icy peaks of Asia's highest mountains, from the desolate, craggy ranges of Mongolia's Gobi Desert to the lofty heights of the Himalayas. Its range is the size of Greenland and spans 12 countries and more than 40 languages and dialects. In many of them, the elusive big cat is nicknamed something that would roughly translate to the "Ghost of the Mountain" – a nod to its secretive nature, and a chilling reminder of the snow leopard's uncertain future. Under pressure from poaching, retaliation killings and the loss of prey and habitat, the Ghost of the Mountain is at risk of vanishing for good.

Few people have ever encountered a snow leopard in the wild, and there remain a lot of open questions about its ecology and behaviour. While we know that at least a few hundred snow leopards die at the hands of humans each year, we can't say with certainty how many remain – estimates range from less than 4,000 to perhaps 7,500 cats.

In the last years, however, advances in technology are allowing researchers to slowly begin peeking into the life of this most secretive big cat.





Few people have  
encountered a snow  
leopard in the wild

ANNE MARIE KAULUS



Some of the most exciting breakthroughs have come from the Snow Leopard Trust's long-term snow leopard study in Mongolia's Tost Mountains in the Gobi Desert. Here, hours away from the nearest town, scientists have set up one of the world's most remote research camps – fitting for the study of one of the planet's most elusive creatures.

For eight years, an international team of researchers has surveyed these mountains with remote-sensor camera traps that take a picture every time an animal passes in front of them. In this time, they've captured thousands of photos of the area's wildlife – ibex, argali sheep, foxes, golden eagles... and the majestic snow leopards!

Each snow leopard's fur pattern is different – like a human fingerprint. Comparing these patterns, our team has been able to identify more than 40 individual snow leopards in the course of this study.

One of these cats is a female named Anu.

## The Story of Anu...

The first time we saw her was in the summer of 2010, when she was around a year old. One of our camera traps had taken her picture as she followed her mother across a sunny meadow.

Tiny and helpless at birth, Anu had already grown into a young adult when we first caught a glimpse of her. Another six months of learning from her mother and she'd be ready to set out into the world alone and establish her own home range.

Snow leopard mothers raise their offspring alone, providing food and shelter for their cubs, and, later, teaching them all the skills necessary for survival in this harsh habitat. At around 18 months, the young cats disperse.

Anu did not diverge from this pattern. When we encountered her again in April 2011, she was on her own, 20km from the last location at which we had photographed her with her mom.

## Tracking Cats

Camera traps are a fantastic tool to observe animals over a long time period – but they have their limitations. They don't tell you what happens between pictures. Do the cats just lounge nearby, and occasionally snap a selfie? Or do they travel extensively, and only come back to the camera once a year? What do they eat? How much? Where do they hunt?

To learn more about the snow leopard's behaviour and needs, we've also used GPS tracking collars. This involves a very skilled and sensitive operation where a wild snow leopard is caught, tranquilized and fitted with a GPS satellite collar. Fitted on a cat, these collars send the animal's location to a satellite every few hours. From there, the data makes its way onto a computer, where our scientists feed it into a custom geo-information program. The result: a map of a snow leopard's wanderings in near real-time!

Less than 50 snow leopards have ever been tracked this way, and only a handful of people have the skills necessary to capture and equip one of these elusive cats with a GPS collar. Our Swedish biologist Örjan Johansson is the most accomplished of them. He has handled nearly 50 wild snow leopard captures and successfully collared 21 snow leopards to date, all as part of our study in Tost!

Thanks to the work of Örjan and his colleagues, we've been able to track the dispersal of two young snow leopards

**ABOVE:** A snow leopard is rarely seen

**ABOVE RIGHT:** Anu's cub being measured

**RIGHT:** Camera trap images of Anu and her den



## EACH SNOW LEOPARD'S FUR PATTERN IS DIFFERENT – LIKE A HUMAN FINGERPRINT

as they grew up. One of them actually left Tost and found a new home in a different mountain range. To get there, this cat crossed some 50km of steppe. Having believed until then that snow leopards do not move out of the mountains, we could hardly believe our eyes!

We've also found out that males and females sometimes share a home range, but that there is very little overlap between the territories of male snow leopards. We've been able to calculate the average size of a snow leopard home range – more than 200sqkm for males, which probably explains why so few people are ever fortunate enough to actually catch a glimpse of the Ghost of the Mountain.

We were learning more and more about wild snow leopards, but the behaviour of mother and cubs was one missing piece of the puzzle – nobody really understood what happened in the months before the cubs first follow their mother out of the den.

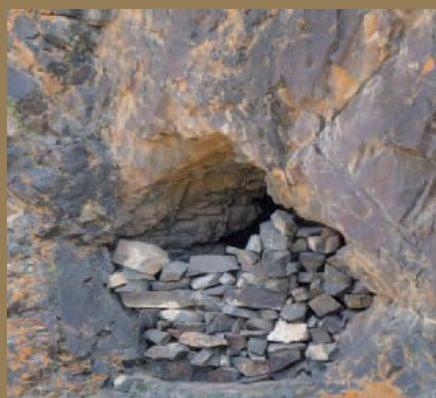
Anu would help change that!

In May 2011, a few months after Anu had set off on her own, Örjan managed to capture her and fit a GPS collar on her. It was most likely too early for her to be pregnant, but, with the collars lasting for up to two years, the team was hopeful for 2012.

For about eight months, Anu was as steady as a young cat can be. She patrolled her home range, took down an ibex or an argali roughly every nine days or so, and lived her solitary life. In early 2012, however, she seemed to change ever so slightly. First, she stayed put in one area for about a week – a very unusual pattern! It seemed like too long a break to just be a kill. Could Anu have met a mate?

She picked up her nomadic life again for a while after that, but soon began restricting her movements more and more, using only a very small portion of her home range at the end. Eventually, she stopped moving altogether.

For Örjan and his colleagues, this was exactly the sign they ▶



had been hoping for. They believed Anu was about to give birth.

They tracked her signals to a remote cave. There, from behind a wall of rocks that must have been built years earlier by local herders, they heard faint sounds. They attached a camera to a stick – a bit of a makeshift set-up, as this was before the era of the ubiquitous selfie-stick – and carefully lifted it over the wall to film the inside of the cave.

Their hearts skipped a beat when they saw the footage! It may only be a few seconds of shaky images, but what the team filmed that day was historical: the first-ever video of a wild snow leopard cub in its den – with its mother, Anu!

The researchers hid nearby, not letting the den out of sight. A cold 48 hours later, their patience was finally rewarded! Anu ventured out of the den to hunt for food.

Contrary to a popular myth, most animal species do not abandon their young if they have been touched by humans – so the team decided to examine Anu's cub, carefully inspecting, weighing and photographing the little kitten. Less than 20 minutes later, they left the den site and waited at a safe distance for Anu to come home.

After a few hours, the new snow leopard mom returned with dinner and settled back into the den with her offspring.

The photos and videos Örjan took that day had a major impact in the scientific community and were celebrated by snow leopard lovers around the world.

Anu, however, didn't seem to be very impressed by her sudden fame. Instead, she soon began taking her cub on excursions outside the den, teaching the little one to hunt and survive in the rugged mountains of their home.

Anu's GPS collar dropped off as scheduled soon after, and the team lost sight of her and her cub for a while.

Our research cameras kept track of them though.

In the fall of 2012, they appeared in a photo – the cub still relatively small. We were anxious to see how the two

cats would fare through the hard Mongolian winter.

A few months later, in early 2013, we got our answer, as Anu and her cub again passed in front of a camera. By then, the tiny ball of fur our team had found in its den had grown into a handsome young adult that would soon set out to find its own home range.

## An Uncertain Future

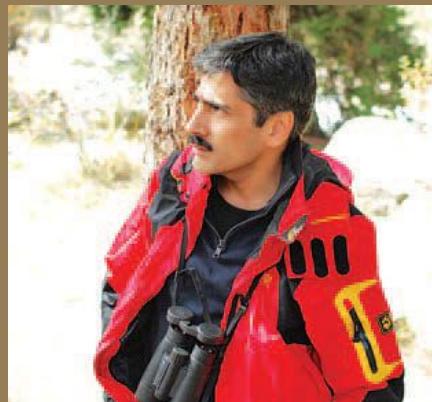
Given the threats these cats face, it's anything but certain that a snow leopard cub will safely grow to adulthood and eventually have cubs of its own. The snow leopard is extremely well adapted to its inhospitable mountain habitat. It's an excellent climber, a stealthy hunter, and can withstand temperatures that would cause us to develop frostbite within minutes. The cat doesn't have any natural predators – but it's not as well equipped to withstand its biggest threat: humans.

Mining and other large-scale development are destroying parts of the snow leopard's habitat, and climate change might fragment up to two thirds of the range. Growing herds of livestock as well as unsustainable hunting have put natural prey species such as argali and ibex under even more pressure. It has become increasingly difficult for snow leopard populations to thrive even if they aren't persecuted directly by humans. Unfortunately, they often are. A recent report by the wildlife trade monitoring network TRAFFIC estimates that between 220 and 450 snow leopards are killed each year across the cat's range.

About a quarter of these killings are by poachers who are after the cat's skin and bones. But, in more than half of all known cases, snow leopards are killed by local people in retaliation for livestock attacks.

As a predator, the snow leopard's instincts lead it to hunt and kill domestic livestock such as goats and sheep, but also horses and yaks, when an opportunity presents itself. For many herders, losing animals is

**A SINGLE PHOTO SHOWED ANU, HER FUR PATTERN CLEARLY VISIBLE, TREAILED BY THREE TINY CUBS**





ABOVE: Anu and her cub

LEFT: Matthias Flechter and Dr Charudutt Mishra

a devastating blow. Livestock rearing provides food and also the only source of income for hundreds of thousands of mostly poor people.

In Anu's home, the Tost Mountains, as in other mountains such as the Himalayas and the Tien Shan, we've been able to work with the local community to find ways for them to coexist with snow leopards. In partnership, we've created community-run insurance funds for livestock, where herders pay small premiums and receive compensation if they lose any animals to snow leopard attacks.

We've also worked with families in the area to jointly build corral fences that can keep snow leopards away from penned livestock, so these attacks can be prevented.

Such measures have helped change the local herders' attitude toward snow leopards. Fear and dislike used to be the most common reaction. Today, many herders appreciate the cat's presence, and no longer feel the need to hunt it.

The change goes even deeper though. Local women have begun to make handicrafts from the wool of their livestock. We sell these products to animal lovers around the world under the Snow Leopard Enterprises label, helping the participating families to earn up to 40 per cent more income!

These programmes have had a positive impact on the snow leopards of Tost. There haven't been any known poaching cases for several years, and the snow leopard population has been stable since 2010. We've even seen

cubs grow up and have offspring of their own repeatedly.

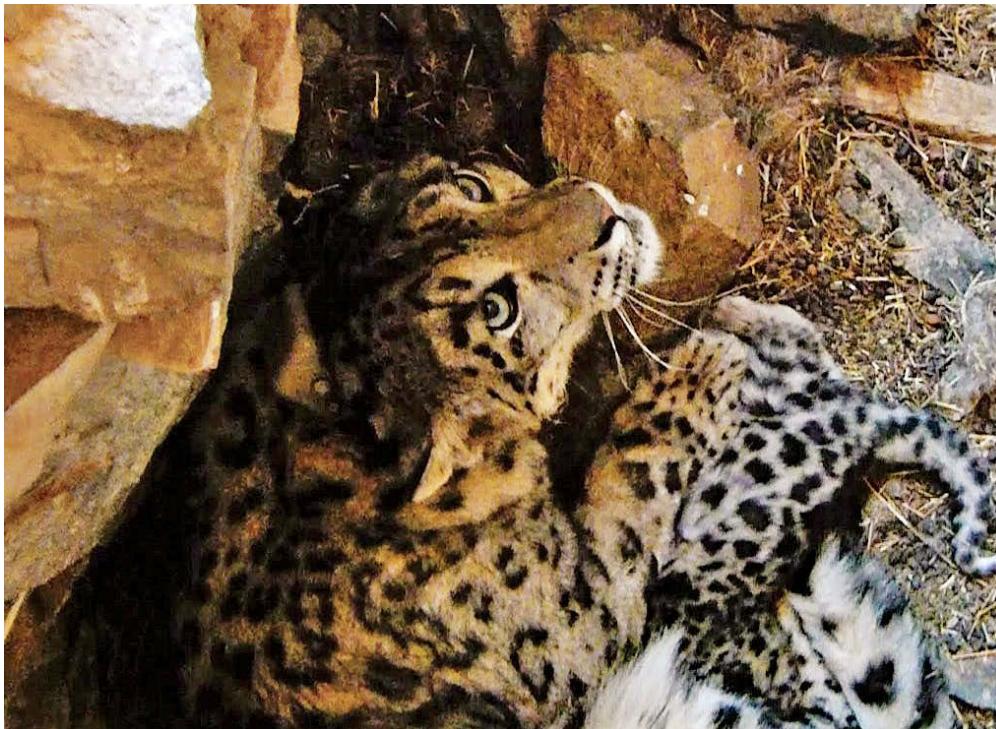
Another threat has been looming over Tost's snow leopards though! This part of Mongolia is rich in minerals, and, all around Tost, companies are digging up the ground to mine coal and gold. One active mine is right on the edge of Tost mountains, and has already cut into potential snow leopard habitat. More than 20 other sites all over Tost have been designated for potential mining.

For years, the local community has fought to limit the impact of mining on their home – and we've been at their side since the beginning. In 2010, they claimed an important victory, when Tost was declared a Local Protected Area, a move that would limit the possible expansion of mining, but would not have been enough to stop it altogether.

In spring 2016, they had an even bigger breakthrough: Mongolia's parliament decided to make Tost a State Nature Reserve and protect it for good! That's great news for Anu and her fellow snow leopards as well as for the local community, who will retain their traditional pastures for future generations.

The information from our study – photos, GPS locations and analysis – has undoubtedly helped convince politicians to act.

Elsewhere in snow leopard habitat, where this sort of information isn't available, it's crucial that we find ways to collect it and make it public! ▶



**LEFT:** Anu and her cub in the den

**RIGHT:** Anu immobilised by Örjan

## Nature Finds a Way

With her habitat relatively secure, Anu has been able to thrive in Tost.

In 2014, a camera trap stationed near a watering hole took pictures of a female snow leopard with three cubs. Naturally, we were elated. Footage of wild cubs is still exceedingly rare, and is always a powerful sign of hope.

In the photos from the watering hole, it's hard to make out much of the mother's fur pattern. It proved impossible to identify the cat. But that didn't stop us! Our team pored over thousands of photos from other cameras, hoping to find more photos of the quartet where they may be more easily identified.

Finally, Dr. Koustubh Sharma, a senior scientist with the Snow Leopard Trust, found the key picture: a crystal-clear image of the mother, trailing her three cubs, taken near the same watering hole, but by a different camera. He was able to confirm that it was the same cat as in the other photos. More importantly, he now had a good picture of her spots to compare with our database of snow leopard photos.

What sounds like a quick job for a computer is actually a bit more complicated than that. Slight differences in posture, angle or lighting can distort fur patterns significantly. Sometimes, what looks like two different cats may indeed be one and the same animal, while

similarities in patterns between two cats can lead to false identifications.

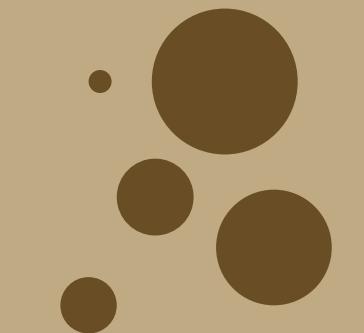
It took some time, and he hit quite a few dead ends, but Koustubh was finally able to confirm that the mother with three cubs was, indeed, our friend Anu.

After her first cub dispersed – probably toward the end of 2013 – Anu wasted no time. She found a mate, and had a new litter of cubs the next spring!

Of course, we were excited about the discovery, and shared Anu's extraordinary story with our supporters immediately. After all, there aren't too many wild snow leopards we know as well as her – and none who have let us watch them grow up and give birth to two separate litters of cubs!

Next, we were in for a wait. It would be months until we could recover the next season's photos, where we hoped to find Anu and her offspring again. Would they have made it through the winter?

The first reports weren't encouraging. Our Mongolian field team brought the cameras back from Tost, and uploaded the photos to a cloud server. They skimmed through them, looking for Anu and her family, but to no avail. Eventually, we began to catalog the pictures more systematically, the basis for any scientific analysis. Soon, it became clear that there was no group of three young adults with their mom.



A LITTER OF  
CUBS DIES,  
AND THE  
MOTHER  
IMMEDIATELY  
REPRODUCES  
AGAIN...  
FOR WILDLIFE,  
IT IS THE CIRCLE  
OF LIFE





What had happened to them? Could they have successfully avoided the 35 cameras we had set up in their habitat? It's not impossible, but not very likely either.

Then, we got our answer – and it was one we had not thought of in any of our scenarios.

It was just a single photo, but it told an incredible story. In the centre, we saw Anu, her fur pattern clearly visible, identified beyond any doubt... and she was being trailed by three tiny cubs – a year after she had been photographed at the watering hole with a litter of newborn kittens!

These new cubs couldn't be older than a few months – but the ones from the previous year would not even have dispersed yet.

It's not impossible that Anu could have had two overlapping litters, but that would have been a first for snow leopards, and really goes against everything we know. Another possibility is, unfortunately, much more likely: it appears as if the 2014 litter had died sometime in the second half of that year, though we have no clue as to why.

With one photo, Anu managed to break our hearts – but, at the same time fill us with hope. Nature once again proved to find a way! A litter of cubs dies, and the mother immediately reproduces again. From a human perspective, it may seem tough, but, for wildlife, it's the circle of life.

For the snow leopard, it's a fragile circle indeed. The species needs better protection, and a large-scale effort to secure sufficient habitats – nature reserves, but also vast areas where it can coexist with humans. With home ranges 2.5 times the size of Manhattan island, this cat simply needs more space than most national parks can provide.

Along with local communities in several range countries, we've shown that coexistence is possible – in Tost, but also

elsewhere in Mongolia, India, Pakistan, or Kyrgyzstan. With other conservation organisations, we have also worked with the governments of all 12 snow leopard countries, who have committed to doing their part as well, pledging to secure 23 habitats across the cat's vast range by the year 2020. Saving the Ghost of the Mountain will be a formidable challenge – but it's one we can master!

## Epilogue: Life Goes On

Our scientists try to look at data as unemotionally as possible, but I'd be lying if I said I didn't wait for the newest photos from Tost with bated breath! How would Anu's tale continue? Just a few days ago, I finally found out!

One of our colleagues played detective, and combed through the 2016 photos as soon as they became available. What he found made all of us smile: Anu, still going strong, followed by three handsome, healthy-looking young cats! They've made it! ☺

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**Dr Charudutt Mishra** is the Snow Leopard Trust's Science & Conservation Director, and a co-founder of India's Nature Conservation Foundation. He has studied snow leopards and their ecology for decades, and has led programs for their protection in India and across the cat's range. Charu has come face to face with wild snow leopards on several occasions.

**Matthias Fiechter** works as Communications Manager for the Snow Leopard Trust, an international organisation dedicated to saving this endangered cat. He has the exciting task of telling stories about snow leopards and the people who work to protect them to wildlife lovers around the world. He has yet to encounter a wild snow leopard, but at least he has seen the cat's traces in the mountains of Ladakh, India.

# What lies beneath

Underwater photographer Alex Mustard has taken the plunge to capture fascinating marine life found on colourful coral reefs around the world

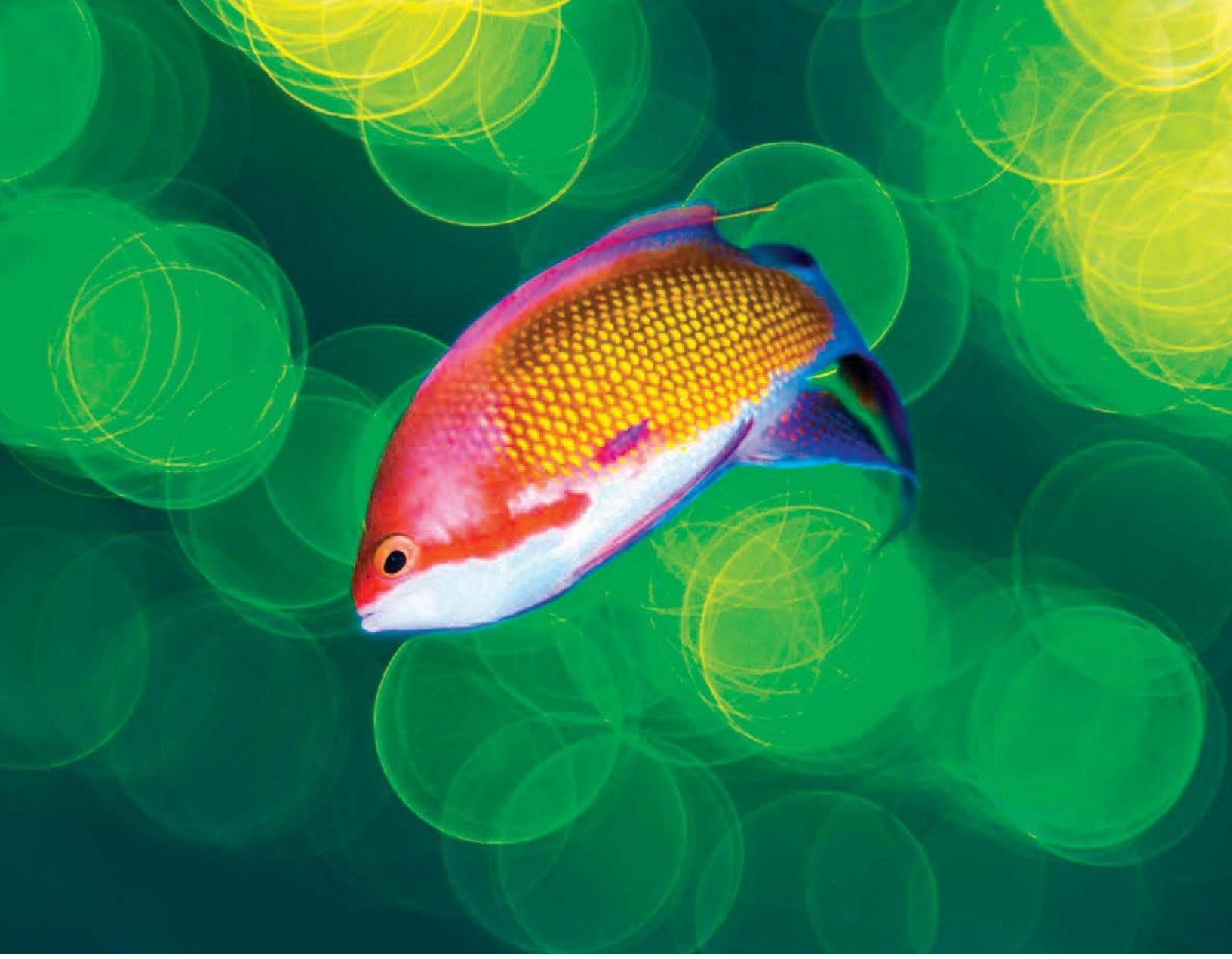
At Vatu-i-Passage, Bligh Water, Fiji, life thrives on the side of a coral reef that faces into the current. Leather corals, soft corals, and sea fans create a vivid scene. A variety of fish species, including magenta slender- and scalefin anthias feed on plankton here. In tidal areas where there are strong currents, one side of the reef comes to life for a few hours, before switching when the tide changes.







A yellow-lipped sea krait swims to the reef after surfacing for a breath of air in the Bohol Sea, Apo Island, the Philippines. Because the sea snake feels vulnerable at the surface of the water, it dives straight back down vertically after filling its lungs. The species is said to be more venomous than a cobra but it's not aggressive.



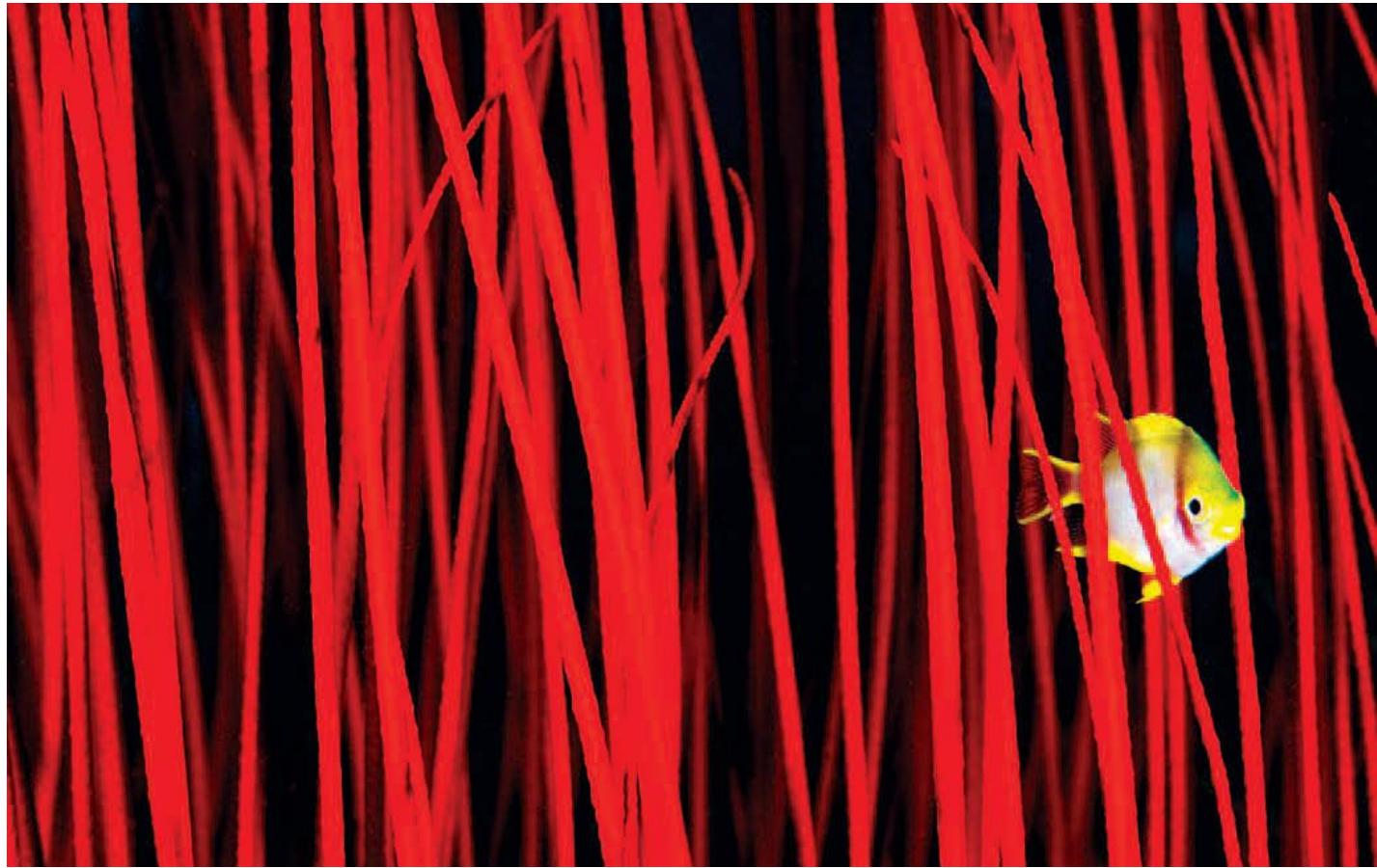
A male scalefin anthias displays in open water at sunset in the Gulf of Aqaba, Red Sea, Egypt. The higher he dances during the courtship, the more likely he is to attract a mate.

◀ A large colony of mountainous star coral spawns at night in late summer in the Caribbean Sea, Cayman Islands. This backlit photo shows the synchronous release of bundles of eggs and sperm from the polyps of the coral. Most reef corals only spawn for a few seconds each year.

The whip coral goby can be found, unsurprisingly, around whip corals. ▶

This image was taken in the Tropical West Pacific Ocean, the Philippines. Gobies perch by creating a cup shape with their pelvic fins.

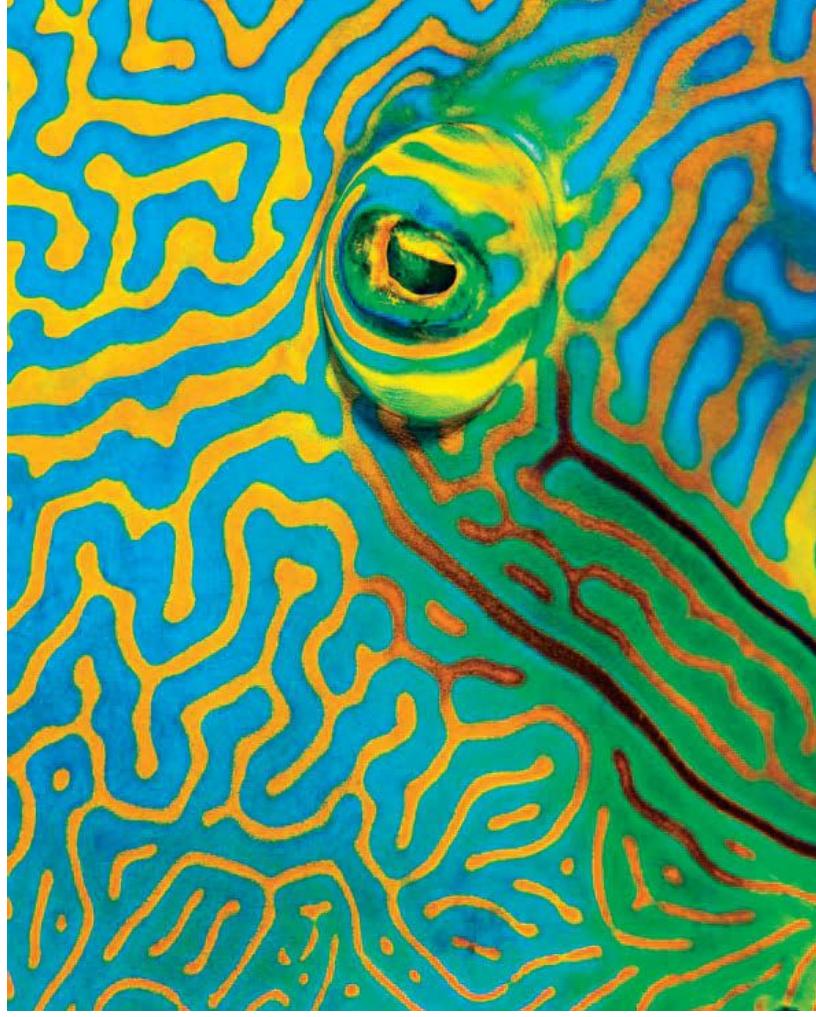




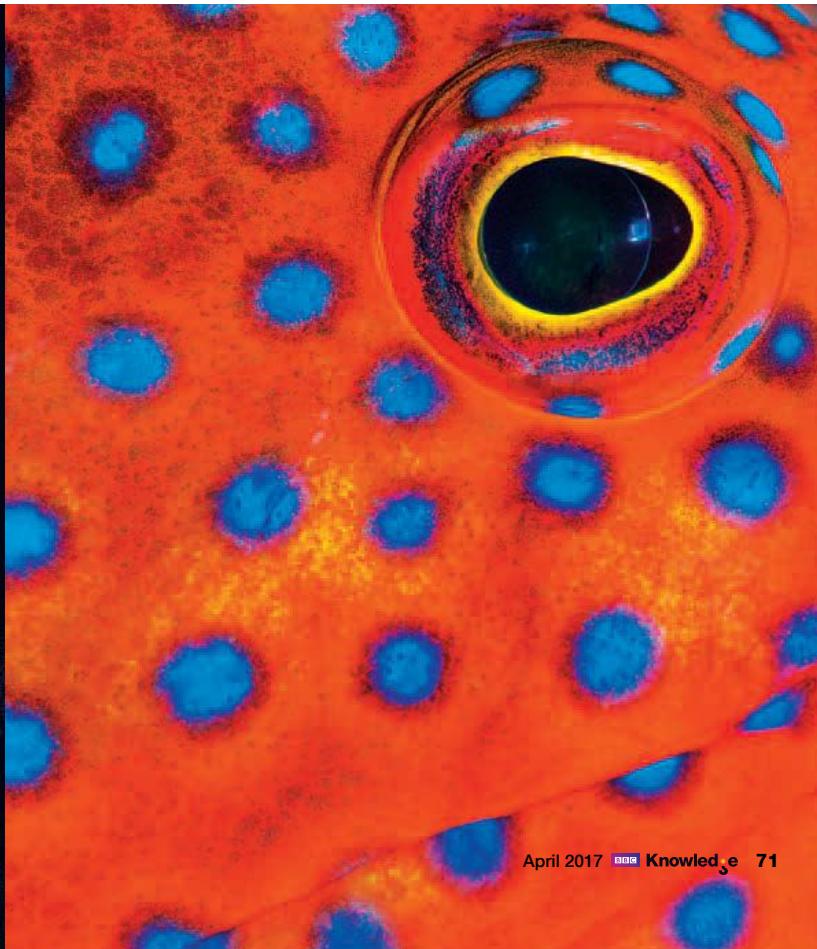
A young golden damselfish hides among the branches of a red whip coral in Misool, Indonesia. The species shelters here for protection from predatory fish such as groupers, snappers and lionfish.

The camera was rotated during this long exposure of a yellow tube sponge in the Caribbean Sea, Cayman Islands. In order to obtain food, sponges pass water through their bodies in a process known as filter-feeding. Water is drawn into the sponge through incurrent pores.





Numerous big fish such as the Napolean wrasse, Red Sea (top left) and the Nassau grouper, Tropical West Atlantic Ocean (top right) are good indicators of a healthy reef. The bright colours of reef species can warn others of the toxins in their skin (bottom left: variable neon slug, Molucca Sea) or can camouflage them on the reef (bottom right: coral trout grouper, Red Sea).





A gorgonian coral fan with a brown crinoid – a feathery starfish that has climbed the fan for a better vantage point – grows in Vatu-i-Ra Passage, Bligh Water, Fiji. Overhangs and caverns are home to filter-feeding species like these because they don't have to compete with reef-building corals that grow in sunnier areas.



An oceanic whitetip shark patrols the deep ocean water off the reef in the Red Sea, Egypt. The species is endangered and subject to fishing pressure throughout its range. The pilot fish following the predator feed on ectoparasites found on the shark's body.

A tiny 10mm pygmy seahorse shelters in a Red Sea fan in the Molucca Sea, Indonesia. This small marine fish only lives on one species of Muricella sea fan and will spend its life concealed between the polyps.

**Alex Mustard** is an award-winning underwater photographer and co-author of *Secrets of the Sea: A Journey into the Heart of the Oceans* (Bloomsbury). See more his work at [www.amustard.com](http://www.amustard.com)







# THIS IS WHY WE DANCE

Millions of people tune in to watch *Jhalak Dikhhla Jaa*.  
But why are we such dance lovers? Science might just have  
the answers, as **Dr Peter Lovatt** finds out



# D

ANCING is in our DNA. It has been found in every culture around the world throughout history, and is enjoyed by people of every age, from toddlers to the elderly.

From a scientific perspective, dance is an important human activity. Actually, from any perspective, dance is an important human activity. It's important for enjoyment, for interpersonal communication, for social bonding and for our general health and well-being as well.

Scientists have long been interested in dance because it can tell us about our innate responses to music, about why some people get dizzy and others don't, about how we find a mate and about the very essence of being human. Dance is something that only we can do (no other animals on the planet can dance creatively like us), and which every human being is equipped for. If you love to dance, welcome to the club. Now let's find out *why* we dance...

## BOOGIE BRAINS

It all begins in our brains. The human brain is specialised for the control of movement – it needs to be, in order to manipulate our 600-plus muscles. The motor cortex, located at the rear of the frontal lobe, is involved in the planning, control and execution of voluntary movements. Meanwhile, the basal ganglia, a set of structures deep within the brain, works with the motor cortex to trigger well-coordinated movements, and may also act as a filter by blocking out unsuitable movements, such as that ill-advised 'funky chicken'. The cerebellum, at the back of the skull, also performs several roles, including integrating information from our senses so that our movements are perfectly fluid and precise.

Just lifting a cup of tea to our mouths involves an unimaginably complicated sequence of nerve impulses, so how can our brains cope with a full-blown dance routine? In 2006, researchers at the University of Texas Health Science Center at San Antonio, the USA, asked amateur tango dancers to perform a basic dance step known as a 'box step' while lying in a PET (positron emission tomography) scanner. The researchers saw activation in a region of the brain called "the precuneus, which is associated with spatial perception. They suggest that this region creates a map of our body's positioning in space, helping us to keep track of our torso and flailing limbs as we plot our path across the dance floor.

RIGHT: Good at keeping time to a beat? Thank your cerebellum for that (highlighted in red)



Of course, dancing also tends to involve music. By comparing the tango dancers' brain scans both with and without music, the researchers noticed that those performing to music had more activity in a particular region of the cerebellum called the anterior vermis, which receives input from the spinal cord. It might be that this region of the brain acts as a kind of neurological metronome, coordinating our different brain areas and helping us to keep time to a beat.

Just like any activity, the more we dance, the better we get, as new neural connections are forged and strengthened. What's more, it seems that our brains may even reward us for having a good boogie. Music has been shown to activate the reward centres in the brain, and some motor areas are also connected to reward-related regions, so dancing can give us the satisfaction of feeling good. It's part of a virtuous circle: we generate rhythm,

**A GROWING BODY OF RESEARCH SUGGESTS WE ARE BORN TO DANCE. WHY ELSE WOULD WE MAKE OURSELVES LOOK SO RIDICULOUS AT SCHOOL DANCES OR THE OFFICE PARTY?**



ABOVE:  
Bulgarian cave  
paintings dating  
back to the Bronze  
Age appear to depict  
ritualistic dancing

we move to it, we feel great, we do it some more.  
Let the good times roll...

### BORN TO BOP?

We still don't know for sure whether humans have evolved an innate instinct to dance, or whether dancing is a learned social activity. Nevertheless, a growing body of research suggests that we are indeed born to dance. Why else would we make ourselves look so ridiculous at school dances or the work Christmas party, when we're desperately trying to impress someone?

To investigate whether dancing is an innate activity, researchers need to look at three factors. First, do humans show an inclination to dance – a natural tendency, or an urge? Second, is dancing automatic – ie, are people able to dance without being taught? And finally, is dancing universal? Do people from all parts of the world display dance-based behaviour?

This last one is easy: dance is truly universal,

both in time and place. Anthropologists have shown that dance-like behaviour dates back thousands of years. Early Bronze Age paintings in the Magura Cave in Bulgaria appear to depict a fertility dance, while dancing was an important part of life in Ancient Greece and Egypt. Dance has played multiple roles throughout history, in religious ceremonies, rituals and festivals, and as a way to heal, entertain and tell stories. It might even have served as an early form of language.

Meanwhile, there's also evidence that dancing is both a natural urge and an automatic behaviour. In 2009, researchers led by István Winkler at the Hungarian Academy of Scientists showed that babies as young as two days old are able to detect a simple beat. When the babies heard a missing downbeat, their neural activity suggested that they were expecting the downbeat to be present – so newborn babies appear to have an innate sense of rhythm. In a separate study in 2010, Marcel Zentner and ▶

## The Science of Dad Dancing



The concept of 'dad dancing' gets a bad press. Even its dictionary definition is disparaging: "Awkward or unfashionable dancing to pop music, as characteristically performed by middle-aged or older men."

In 2011, I carried out a survey of almost 14,000 people (including over 8,000 men), looking at dance confidence and dancing styles at different ages. I found that men's dancing confidence typically starts at a very low level in the early teens, steadily increasing with age, peaking and plateauing in the mid-to-late thirties before coming down again

after 40. At the same time, their freestyle dance movements tend to become larger, less coordinated and more random the older they get. Eventually, it's like they're dancing to music that only they can hear.

This slightly awkward dancing style may be evolution's way of signalling reduced testosterone levels, warning younger women that the dancer is past his sexual prime and that they might be better off looking elsewhere.

But men, don't let any negativity put you off. The benefits of dancing are enormous. In the name of science, we should reclaim dad dancing, rebrand it and embrace it.

# 5

## REASONS WHY DANCING IS GOOD FOR YOU

### IT BOOSTS SELF-ESTEEM

Several studies have shown that dancing can help to increase feelings of self-worth. In one 2007 study, researchers from Laban and Hampshire Dance, the UK, found that children aged 11 to 14 who took part in creative movement classes reported improved self-esteem, motivation, and more positive attitudes towards dance, as well as better physical fitness.



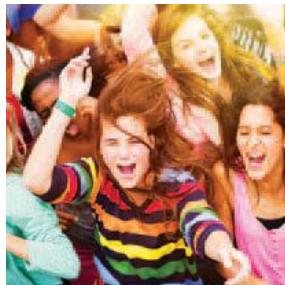
### IT HELPS YOU FIND A MATE

It was Charles Darwin who suggested that dancing can act as a form of sexual selection, and research suggests that we are indeed communicating to potential mates when we strut our stuff. A 2011 study asked women to rate men on their dancing prowess. The winning formula? Head shaking, torso bending, and twisting of the right knee, apparently.



### IT TACKLES DEPRESSION

Dancing has been shown to reduce feelings of depression. But different dancing styles have different effects. In a study led by Andrew Lane at the University of Wolverhampton, the UK, dancing characterised by relaxed, free-flowing movements helped to improve mood, whereas dancing in a physically contracted way had the opposite effect.



### IT HELPS SOLVE PROBLEMS

Just five minutes of freestyle dancing is enough to increase your creativity, according to researchers at Sheffield and York Universities, the UK. In 2014, participants were asked to either dance, cycle or sit quietly while listening to music, and it was the dancers who showed improvements in both mood and creative problem solving.



### IT RELIEVES PAIN

Rugby is a tough game played by tough people. But some rugby players will dance before a game – just think of the New Zealand team's *haka*. In 2015, researchers at the University of Oxford, the UK, found that group dancing can increase a person's threshold for pain. Dancing, it seems, can release endorphins, helping to take the sting out of a full-contact tackle.



**AS WITH ANY INTENSE PHYSICAL ACTIVITY, DANCING CAN ALSO RELEASE ENDORPHINS – THE FEEL-GOOD, PAIN-RELIEVING BRAIN CHEMICALS RESPONSIBLE FOR THE SO-CALLED ‘RUNNER’S HIGH’**



**ABOVE LEFT:**  
Flash mobs aren't just good fun, they may help participants to bond too

**ABOVE:**  
Grab your friends and have a dance if you want to enjoy a social high

Tuomas Eerola showed that older babies make more rhythmic body movements in response to music than they do to human speech, and some even speed up their movements when the tempo is ramped up. The evidence suggests that humans are hardwired to boogie.

### DANCING FOR JOY

If our brains are primed for dancing, it's no surprise that we love to get our groove on. But there's another reason, too: it's a fantastic mood enhancer. I've been drunk on disco, made merry by a *merengue* and felt the euphoria of dancing in a hot, sweaty nightclub. And it seems that everyone can experience that euphoria: Zentner and Eerola even found that their baby subjects smiled as they moved to the rhythm. The more they moved, the more they smiled.

So why does dancing make us feel better? It might be because, as we move together in response to music, we also move in response to each other's rhythms, helping us to form a social bond. It's one of the reasons why we love music festivals. A 2010 study by Sebastian Kirschner and Michael Tomasello at the Max Planck Institute for Evolutionary Anthropology showed that, after a session of paired music making, four-year-old children were more likely to behave cooperatively and helpfully. Music and dancing act

as a kind of social lubricant, helping us to bond and form positive relationships.

As with any intense physical activity, dancing can also release endorphins – the feel-good, pain-relieving brain chemicals responsible for the so-called 'runner's high'. In fact, Bronwyn Tarr and colleagues at the University of Oxford have found that just dancing in time with someone might be enough to release these neurohormones into the bloodstream.

They asked Brazilian high school students to dance in groups of three to fast-paced music, finding that those who synchronised their movements had an increased pain threshold (as measured by inflating a blood pressure cuff around their arm). This suggests that there were more endorphins in these dancers' bodies, so the researchers speculate that we might get a social 'high' from dancing with others. That would explain flash mobs, at least.

Dance is one of the most important activities we can do. We are born to groove. It's what our brains are wired for and it helps us bond. Dancing is good for you. So, throw caution to the wind and get your body moving to all those cheesy tunes. ☺

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Dr Peter Lovatt is a dance psychologist who runs the Dance Psychology Lab at the University of Hertfordshire, the UK.





# How should history remember **Fidel Castro?**

To many, he was a heroic champion of the disenfranchised; to others, a cruel tyrant. Following Fidel Castro's death in November 2016, we asked five historians to offer their verdicts on the Cuban leader's life and legacy

COMPILED BY MATT ELTON

**“He inspired everyone from Black Power activists to South African freedom fighters”**

**SIMON HALL**

Castro was a revolutionary who symbolised his age. In December 1956, he returned from exile in Mexico, determined to overthrow the dictatorship of Fulgencio Batista, Cuba's American-backed strongman. Arriving on 2 December aboard the Granma, Castro boldly predicted that “we will be free or we will be martyrs.”

It was a cry that resonated with the times: 1956 saw a historic victory for African-Americans in Montgomery, following a year-long boycott of the city's segregated buses, while, in South Africa, tens of thousands of women took to the streets of Pretoria to denounce apartheid.

The year also ushered in independence for Sudan, Tunisia, Morocco and the Gold Coast – the first surrender of colonial power in sub-Saharan Africa – and witnessed a popular uprising against Stalinist rule in Hungary. In the decade that followed ▶



triumphant march into Havana, in January 1959, the Cuban Revolution proved an inspiration for Black Power activists, opponents of the war in Vietnam, South African freedom fighters, Latin American revolutionaries, and radical students in Britain, Europe and the United States.

Castro's death at the end of 2016, a year whose highlights included Brexit and the election of Donald Trump, is a reminder that, today, the forces of history appear to be marching to a very different beat.

Simon Hall is professor of modern history at the University of Leeds, the UK, and the author of *1956: The World in Revolt* (Faber and Faber, 2016).

## **“In 1980, more than 125,000 Cubans fled what had become a poverty-stricken Marxist hell-hole”**

**ANDREW ROBERTS**

History will remember Fidel Castro primarily for the Cuban missile crisis of 1962, during which he acted as the pawn of Nikita Khrushchev's Soviet Union, in what, in retrospect, was a madcap scheme to station hostile nuclear weapons only 90 miles from the United States. He will be remembered for overthrowing a profoundly corrupt pro-American dictatorship under Fulgencio Batista, which he proceeded to replace with his own Marxist-Leninist, anti-American regime that soon came to rely on terror and detentions to survive.

The abortive Bay of Pigs operation undertaken by CIA-backed Cuban rebels in 1961 to try to overthrow Castro will be recalled as one of the lowest moments of the Kennedy administration. Castro's interminable five-hour-long speeches to the Central Committee of the Communist party will also be remembered (though obviously not their content). So will the way he attempted to destabilise various southern African countries in the 1960s and 1970s in an attempt to export revolution. And let's not forget that hijackers and terrorists of all ideologies yelled the phrase "Take me to Cuba!" since he offered unquestioning sanctuary for them there.

When, in 1980, Castro allowed

emigration from the port of Mariel, more than 125,000 people were so desperate to leave that they risked their lives in often unseaworthy vessels to escape a country that was by then a poverty-stricken Marxist hell-hole, albeit one with relatively high literacy rates and universal healthcare. With an average income of ₹1254 per month, nothing to read that wasn't approved by the Communist party, some 8,600 people arrested and detained without proper trial in 2015/16, and no free elections for over half a century, history will conclude that Castro's death could not come quickly enough for his people.

Andrew Roberts is a historian and the author of books including *Elegy: The First Day on the Somme* (Head of Zeus, 2015).

## **“Castro seems to provide proof of the dictum: “Power tends to corrupt and absolute power corrupts absolutely”**

**MARK WHITE**

Fidel Castro will be remembered in strikingly different ways. Many Cubans will regard him as the father of the Cuban Revolution who, with courage and skill, defeated the efforts of its mighty American neighbour to overthrow him at the Bay of Pigs in 1961, survived several CIA assassination plots, and sustained the revolution for half a century. His supporters will also point to his success in enhancing the quality of life for Cubans by establishing free and universal education and medical care.

To many in the west, not least the many Cubans who fled their homeland for the United States after the revolution, he will be viewed largely as a corrupt, nefarious dictator who failed to introduce democracy in Cuba and to uphold basic human rights. His record on the economy was unimpressive too, especially once Soviet aid diminished at the end of the Cold War. The advent of the Cuban missile crisis, the most dangerous episode of the Cold War, would not have taken place had Castro not accepted Soviet leader Nikita Khrushchev's request to deploy missiles in Cuba. Most troublingly, at the height of the

missile crisis, Castro urged Khrushchev to launch a nuclear strike on the United States if Kennedy authorised an invasion of Cuba.

Reflecting on the early days of the revolution, when many in Cuba and elsewhere hoped Castro would bring progressive, enlightened, democratic leadership to Cuba after the corrupt dictatorship of Batista, Castro seems to provide proof of Lord Acton's famous dictum: "Power tends to corrupt and absolute power corrupts absolutely."

Mark White is professor of history at Queen Mary University of London, the UK.

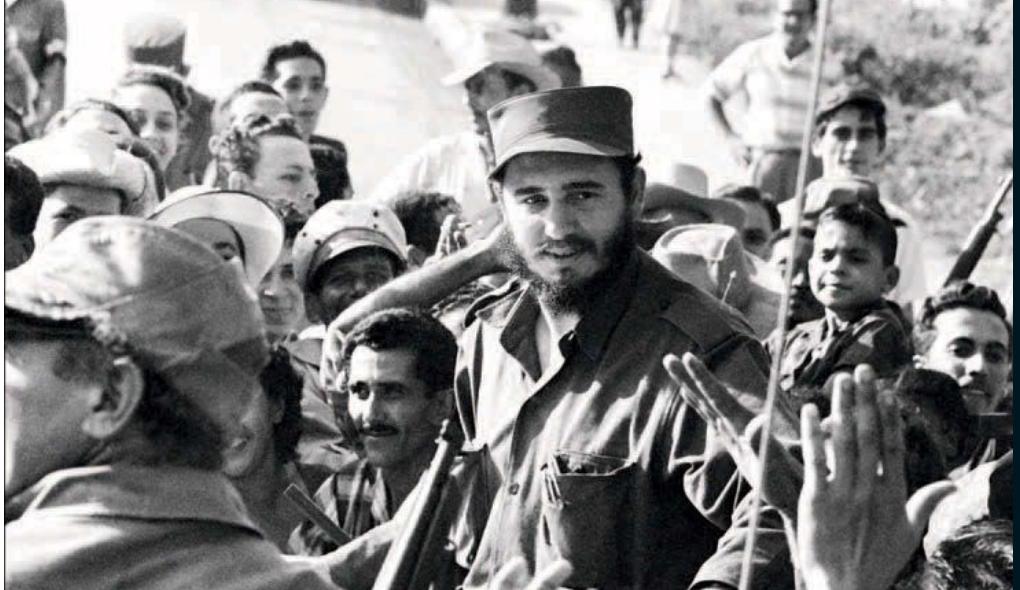
## **“Simultaneously, he was an advocate for the world’s poor, and a petty and compulsive tyrant”**

**JULIE BUNCK**

Fidel Castro's impact on the world was both profound and multidimensional. By 1970, he stood as a spokesman for the developing world, a role model for the people of Latin America, the leader of the so-called Non-Aligned Movement, a liaison between revolutionary movements across the globe and the Kremlin, a thorny nuisance for the US government, the symbolic coach of one of the world's most competitive and dazzling sports powers, and an articulate advocate in the United Nations for economic empowerment of the world's poor at the expense of the rich. Simultaneously, he ruled in Cuba as a petty, self-absorbed and compulsive tyrant, who responded brutally to Cubans on the island who dared to reject his socialist vision. He seized property, slammed shut the doors of the nation's religious institutions, and drove hundreds of thousands from their home to other lands.

For nearly six decades, he held tenaciously to a Marxist-Leninist vision that rejected the market, relied on citizens' distrust of one another to ensure conformity, restricted movement on the island, and prohibited travel abroad, rewarded his obedient followers with moral and material rewards, and punished dissidents by denying them basic comforts.

A common thread running through his policies was the effort to develop



Castro receives the acclaim of supporters just before entering Havana during the Cuban Revolution, January 1959



A Cuban refugee in Miami watches President Kennedy addressing America during the Cuban missile crisis, October 1962



Cuban exiles congregate on the streets of Miami to celebrate Castro's death, 26 November 2016



US coast guards rescue Cuban refugees from their capsized raft in the Florida Straits, August 1994

a revolutionary 'conciencia' (conscience) among his people, to eradicate pre-revolutionary attitudes, and to mould a 'new Cuban man'. Sadly, new attitudes, including those regarding the role of women, the centrality of manual labour, and a revolutionary education, generally failed to materialise, and the revolutionary vision faded as the Cuban economy deteriorated and a hopelessness cast a shadow over the island.

Julie Bunck is professor of political science at the University of Louisville, the USA.

## “Castro’s challenge to global capitalism was far more enduring than the Soviet Union’s”

**TANYA HARMER**

Fidel Castro changed the world, defying the logic of global power and geography. From a small island, 90 miles from Florida, the revolutionary regime he led posed a radical challenge to the United

States, global capitalism and colonialism.

Remarkably, this challenge proved far more consistent and enduring than the Soviet Union's. In Africa, Castro's troops fought against colonialism and apartheid South Africa. In Latin America, the Cuban Revolution's example transformed politics and society, putting long-standing questions of land reform, education and healthcare firmly on the agenda. It also mobilised thousands to take up arms, believing they could emulate Castro's success.

By launching military invasions, violent counter-insurgency campaigns or reformist programmes designed to immunise the region from Cuba, those who feared Castro's example made him far more powerful than he might otherwise have been. Indifference was simply not an option.

However, history desperately needs to put Castro in context to understand his impact. For too long, the potent narrative of the heroic guerrilla (believed by admirers and enemies alike) that Castro so ably promoted has obscured far more complex and long-term causes of the Cuban Revolution.

Castro was a man of his times, who channelled widespread desire for change. His revolution addressed pressing problems and provided an alternative to moderate reform efforts cut short by elites and CIA-backed military coups. As well as remembering him for changing the world, we need to remember the reasons his actions and ideas resonated as powerfully as they did. ■

Tanya Harmer is associate professor in the department of international history at the London School of Economics and Political Science, the UK.

### SOCIAL MEDIA

- How do you think history should remember Fidel Castro? Let us know via Twitter or Facebook:  
Twitter: [twitter.com/knowledgemagind](http://twitter.com/knowledgemagind)
- Facebook: [facebook.com/knowledgemagazineindia](http://facebook.com/knowledgemagazineindia)



PHOTOS: GAUTAM RAJYADHAKSHA COURTESY ASHISH SAWHNEY

# Ismat Chughtai

Author and historian  
**Urvashi Butalia** details  
the life and words of  
a feminist powerhouse



**M**ANY years ago, I went, with some trepidation, to meet Ismat Chughtai. I was then a fledgling publisher, with not even one published book to my credit. Instead, I carried with me a dream – of a feminist publishing house – which had a name (Kali for Women), but no substance. Ismat *Apa*, as she was known to all and sundry, was in Delhi to meet with some relatives from across the border in Pakistan, and they had helped set up a meeting with her.

What kind of person would we find at the other end? Chughtai was one of the greats of Indian literature; what would she make of a young and new publisher approaching her like this? At the time, very little of her work – indeed only one story so far as I know – had been published in English. But, in the Urdu world, she was much loved and much published. Discussions with people about what kind of person she was and whether she would be at all open to a small publisher approaching her yielded nothing.

All doubt disappeared, though, the moment she entered the room where we waited to meet her. In walked a woman with a mass of silver grey hair that seemed to have a life of its own in the way it curled every which way, but what struck me immediately was the twinkle in her eye and the kindness on her face. That meeting led to a long association with Ismat *Apa*, and, in the years to come, we, as feminist publishers, brought out a fair amount of her work in English translation.

#### **SPRUNG FROM A LIBERAL FAMILY**

Born in 1915, Ismat Chughtai became one of India's best-known Urdu writers; her strong character and political beliefs set her apart as someone to be reckoned with, in her writing and in real life. Her irrepressible sense of humour and her irreverent takes on many things often confounded both her friends and enemies. In many ways, she was one of the early feminists: unafraid and passionate, she wrote about women's lives with both humour and compassion.

Ismat Chughtai attributed the frankness of her writing to her liberal upbringing. Her father was a civil servant whose job meant there were frequent transfers; Ismat was brought up in Jodhpur, Agra and Aligarh, and, later, she went to college

## **Her irrepressible sense of humour and her irreverent takes on many things often confounded both her friends and enemies**

in Lucknow. The ninth of 10 children, she grew up in the company of her six brothers. Her sisters, who were older, were married early. Ismat often spoke of this, describing herself as a 'tomboy' who learnt to play hockey, football and the street game called *gilli danda*. She laughingly described how this offended her relatives, particularly the women who would complain to her mother, and how she (Chughtai) felt this was so unfair because "the culprits were my brothers."

It wasn't only sport and outdoor activities that her brothers gave to her though. One of them, Mirza Azim Baig, was also a writer, and it was to him that she often turned for advice on her own writing. This meant a great deal to her, as her relatives were, by and large, opposed to both her desire for education and her love of writing, and, for quite some time, she had to write in secret. The immediate family, however, was liberal and it was those values that Ismat carried with her into her life, marrying a Hindu and asking to be cremated after her death. In fact, she wrote of her family that they were "Hindus, Muslims and Christians who all live peacefully." She herself was as familiar with the Hindu scriptures as with the *Quran*.

In the 1930s, while at college, she

became part of the Progressive Writers Association (PWA), set up by a group of progressive and left oriented writers who were opposed to imperialism and who wrote and published works that related to the hard realities of life on the ground. Chughtai brought feminist politics into this world, and, throughout her association with the PWA, and indeed in her writing life, she continued to focus on the ways in which society treated women, and to point her finger at the discrimination they faced on a daily basis.

Later in life, she wrote in her non-fiction work, *Yahaan se Wahaan Tak*: "The pen is my livelihood and my friend, my confidante, a walking talking friend in my hours of loneliness. Whenever I want I can send for anyone via the pen's flying carpet, and when these people arrive, I can say anything, make them cry, laugh, or reduce them to ashes with my harsh words. And if I feel like it, destroy them by tearing them up into innumerable tiny fragments..."

#### **STORIES OF WOMEN'S LIVES**

In the early days, the short story was her preferred form of writing, and many of the stories she created became iconic in the ways in which she dealt with the realities of women's lives and the situations they were trapped in. She sought inspiration from her contemporaries; in particular, Urdu writers Rashid Jahan and Saadat Hasan Manto, but she was also influenced by western writers such as D H Lawrence and George Bernard Shaw and Sigmund Freud.

Her early story collections include *Chhui Mui, Thori si Pagal, Aik Baat, Do Haath* and others. She wrote a number of novellas, among which *Ziddi* was made into a film of the same name. Her best-known full-length work was her magnum opus novel, *Tehri Lakeer* (The Crooked Line), which brought her much fame and appreciation.

Chughtai also wrote plays, a form that critics say she did not take to so well, not knowing how to think in terms of the actual staging of plays (one critic said she could not differentiate between scenes and acts). More successful was her non-fiction writing – the essays and memoirs (in particular *Kaghazi hai Pehraan*, and a moving piece she wrote on her brother, Azim Baig, shortly after he died). ▶



Chughtai's husband, Shaeed Latif, whom she married in 1941, was a film director and screenwriter. She brought her characteristic humour to bear on her marriage too, saying, in *Yahaan se Wahaan Tak*: "I told Shahid before we got married that I'm a very troublesome woman, later on you'll regret marrying me. I have been breaking chains all my life. I won't be bound in any chain now. It doesn't suit me to be an obedient, virtuous woman, but Shahid didn't listen to me... the day before our wedding I warned him again. There's still time, listen to me, all our lives we'll be friends, I'm saying this as a friend." She went on to say, "Shahid treated me as an equal and that is why we led a pleasant married life." Together, they collaborated on a number of film projects, such as *Ziddi*, *Arzoo* and others.

One of the defining moments in Chughtai's life was the Partition of India, a time when Indians were forced to choose which nation they wished to belong to. Like many other writers, Chughtai, too, was faced with this choice and she decided (unlike, say, Saadat Hasan Manto who left for Pakistan) to stay on in India.

#### WRITING HERSELF INTO CONTROVERSY

In 1942, Chughtai published a short story, *Lihaaf* (translated as *The Quilt*), which was to propel her into the public eye and place her at the heart of a controversy that became a talking point in colonial India. *Lihaaf* tells the story of two women, one a maid-servant, and the other, her mistress

who is unloved by her husband, and describes, through innuendo and skilful but not explicit use of language, the lesbian relationship between them. The story is told from the perspective of a young girl, who describes what she sees, and the reader is left to understand the meanings of what has been described. The story caused a furore, not only because it transgressed the 'norm' of heterosexual relations but also because it addressed the issue of class. At the time, the world of Urdu writing was dominated by men writing from a broad left perspective, and many women writers wrote from within the confines of the family and patriarchy. Chughtai's story was attacked for being obscene, charges were levelled at the magazine *Adab-i-Latif* in which the story had been published, and a case was filed against her in the Lahore court. Chughtai herself wrote later in life that at the time she wrote *Lihaaf*, she did not know the meaning of the word 'lesbian', that as young women, she and her friends would talk about these things without really knowing what they meant. In her autobiographical writings (*Kaghazi Hai Pehraan*), Chughtai describes with a wonderful touch of humour how she was mixing baby food for her young daughter when the police arrived to serve the court summons. She refused to accept it at first, and simply laughed, much to the chagrin of the officers and the consternation of her husband and a friend who was visiting. Then, she tried to hand the baby bottle to the man serving the summons while she read it. Finally, she read it and asked what she was required to do: pay a fine or go to jail, she was told. At the police station the next day, she found the jails had space only for male undertrials. So she asked where they planned to keep her, a question to which the authorities had no answer. But, as she describes it with her

characteristic humour, she was excited at the prospect of seeing 'convicts' in the jail. Much to her disappointment, the men behind bars turned out to be a ragtag bunch of weak and hungry-looking men, not the ruffian-like dacoits she had imagined. Roughly around the same time, the Urdu writer Saadat Hasan Manto, too, was served a court summons for his story, *Bu*, and Chughtai and Manto found themselves in Lahore for the hearings. She recalls her excitement at visiting the city that was 'decked up like a bride' and spending days with Manto and her husband, shopping and partying. At one point, she writes, her father-in-law wrote to her husband: "Give *dulhan* some advice, tell her she should write something about Allah and the Prophet so that her afterlife may be blessed." Whether she was given the advice or not is impossible to tell, but she continued to write and shock. Chughtai and Manto fought their cases in court, turning the courts into a theatre of delicious comedy, taking apart words in their works and asking if words like 'bosom', or 'ashiq' were obscene. In the end, the case could not be upheld as no obscene material was found in their writings. Later, the two writers were to go their different ways, Chughtai choosing to stay on in India and Manto moving to Pakistan.

In time, Chughtai's writing travelled into the international world and, today, she is well known, not only for her fluency of language and her sensitivity to women, but equally for the strong women characters she created, and for the sheer joy with which she wrote. She garnered many awards in her life, and created a new feminist aesthetic, ensuring that the woman's voice was heard loud and clear. In the 1970s, she worked with Kaifi Azmi on the story of *Garam Hawa*, a film that describes the aftermath of Partition and that became a classic of its time. Little wonder that her contemporary, Urdu writer Quratulain Hyder described her as a 'female Changez Khan'. ☐

**She was mixing  
baby food for her  
daughter, when  
the police arrived  
to serve the court  
summons**

**Urvashi Butalia** is the director and co-founder of Kali Women, India's first feminist publishing house. A recipient of the Padma Shri award, she is a historian whose research focuses on the Partition and oral histories. Her book, *The Other Side of Silence*, collates the tales of the survivors of the Partition.

# PUZZLE PIT



## YOUR DETAILS

NAME: \_\_\_\_\_

AGE: \_\_\_\_\_

ADDRESS: \_\_\_\_\_

PINCODE: \_\_\_\_\_

TEL: \_\_\_\_\_ MOBILE: \_\_\_\_\_

SCHOOL/INSTITUTION/OCCUPATION: \_\_\_\_\_

EMAIL: \_\_\_\_\_



**How it's done:** The puzzle will already be familiar to crossword enthusiasts, although the British style may be unusual as crossword grids vary in appearance from country to country. Novices should note that the idea is to fill the white squares with letters to make words determined by the sometimes cryptic clues to the right.

The numbers after each clue tell you how many letters are in the answer. All spellings are UK English. **Good luck!**

## WINNERS FOR CROSSWORD NO. 36

Priyanka Priyadarshini Jena, Orissa

Veena Karamkar, Telangana

## SOLUTION OF CROSSWORD NO. 36



## CROSSWORD NO. 37

**DOWN**  
1 What a marsupial carries its young in (5)

5 Bird that is mentioned in Samuel Taylor Coleridge's Rime of The Ancient Mariner (9)

8 Flesh-eating animal (9)

9 A wild pig (4)

11 English naturalist who hosted Planet Earth and many other nature documentaries (5,12)

13 Darwin's theory (9)

14 Animal that has the longest annual migration (6,4)

16 At the risk of extinction (10)

18 Venus flytrap's diet (7)

20 The world's fastest land animal (7)

22 Wild cat one might spot in Sanjay Gandhi National Park (7)

23 The only penguin species that lives in the Northern hemisphere (9)

25 Lions and tigers (7)

27 An expedition into African jungles (6)

28 Land mammal with the longest neck (7)

## DOWN

1 Catching game or fish illegally (8)

2 Where bees live (4)

3 Hyena type that are largely scavengers (7)

4 National park in Uttarakhand that was established to protect the endangered Bengal tiger (7)

5 South American rainforest famous for its rich biodiversity (6)

6 World's longest snake (11,6)

7 \_\_\_ of the desert: Camel of course (4)

10 Lion sanctuary in Gujarat (3)

11 Extinct flightless bird (4)

12 Beaver for one. Ferret for another (6)

13 African antelope (5)

14 Snake that you might find in 5 Down (8)

15 The name hippopotamus comes from the ancient Greek for \_\_\_ (5,5)

17 Tanzanian national park famous for its migratory wildebeests and zebras (9)

19 Australian wild dog (5)

21 A hybrid offspring of a horse and a donkey (4)

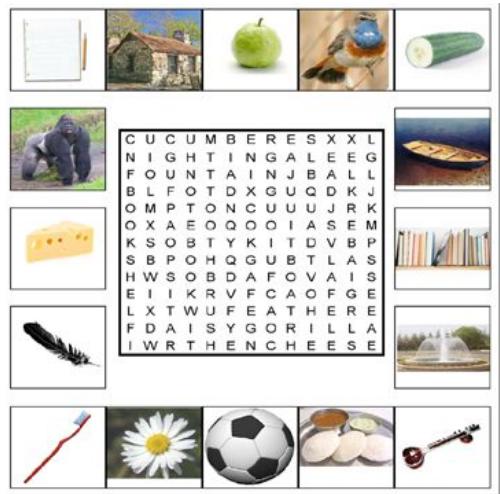
24 Large American wild cat (4)

26 Water source for wild animals (4)

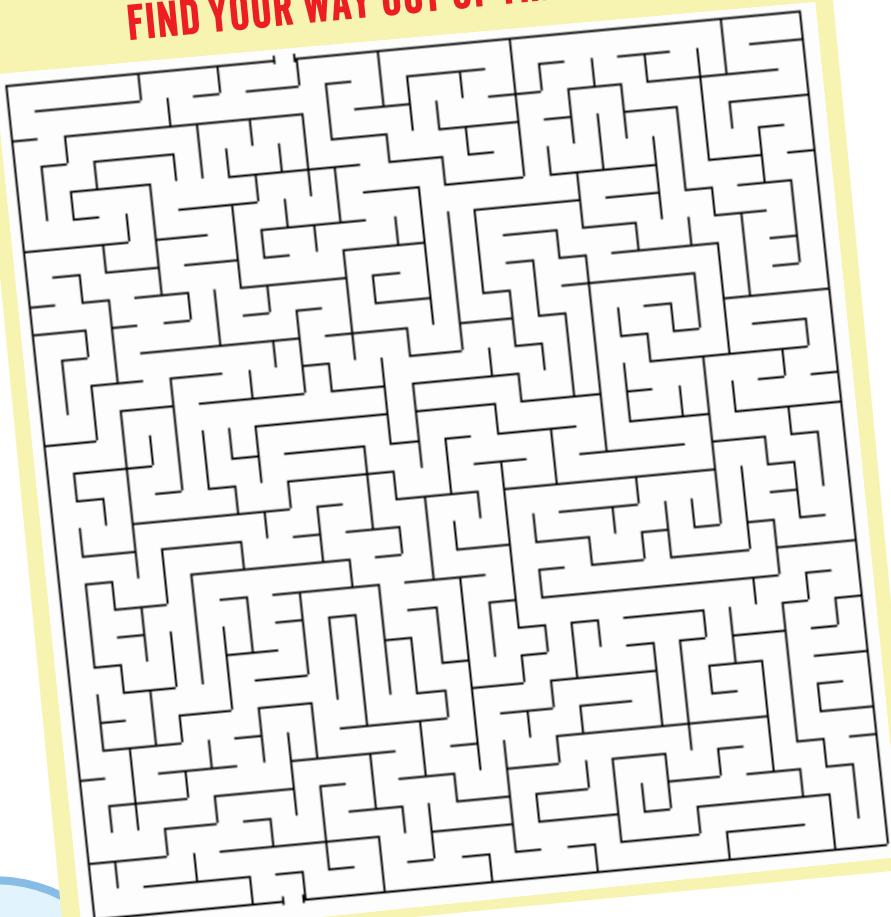
# PUZZLE PIT

## PICTURE SEARCH

In the jumble below, the words represented by each of the 16 pictures are hidden either horizontally, vertically or diagonally forward or backwards but always in a straight line. See how many of them you can find? Look out for descriptive names.



## FIND YOUR WAY OUT OF THE MAZE



## SCRAMBLE

Solve the four anagrams and move one letter to each square to form four ordinary words. Now arrange the letters marked with an asterisk (\*) to form the answer to the riddle or to fill in the missing words as indicated.

DEGAA	*		*		*	
EENIS	*		*		*	
BEIULN	*				*	
ACNORM	*				*	

The greatness of a nation can be judged by the way its \_\_\_ are treated. Mahatma Gandhi (7)

## HEAD & TAIL

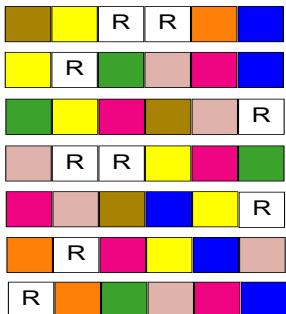
Look at the clue to fill the blank in the form of a compound word. The second part of the answer is the first part of the next answer, etc.

Archer's Weapon	Long
Prostrate	
Dispirited	
Extremely Robust	
Ruthless control	
Brawl	
Defend oneself	Back

## ENIGMA CODE

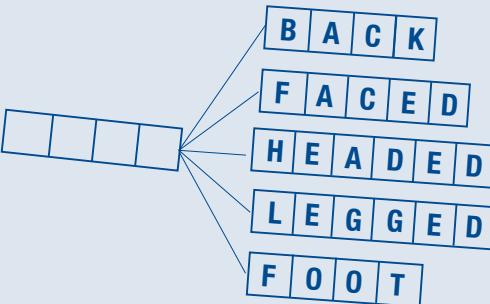
Each colour in our code represents a letter. When you have cracked the code, you will be able to make seven words. The clue to the first word is given to help you get started.

**The clue: Asinine Incentive**



## DOUBLE BARRELLED

What word can be placed in front of the five words shown to form, in each case, another word?



## BRAIN TEASERS

- 1) While walking down the street I met a man. He tipped his hat and drew his cane and, in this riddle, I told his name. What is the man's name?
- 2) A train enters a tunnel at 7 o'clock, another train enters the exact same tunnel, also at 7 o'clock on the same day. The tunnel only has one track, and no other means for the trains to pass, around, over, or under. However, both trains made it to the other end of the tunnel untouched. How could this be?
- 3) If I have 2 kinds of coins consisting of one rupee coins and fifty paise coins and I am offered ₹ 22/- for 27 coins, how many would you say I should give of each coin?
- 4) What is full of holes, but can still hold water?
- 5) What goes around the world and stays in a corner?

## PICK & CHOOSE

Solve the six clues by choosing the right combination of sets of letters given below. Each set of letters can be used only once and only in the order given. The number at the end of the clues specifies how many sets of letters are used in the solution.

1. Capital of Australia (3)
2. Prevarications (2)
3. Large apes (4)
4. Sovereigns (2)
5. Recognized or accepted (4)
6. Murder (3)


GED	LI	ACK	ANS	BER	OR
RA	MON	UT	CAN	NOW	LED
ARCHS	ICI	ANG	ES	DE	HOM

## BBC KNOWLEDGE QUIZ

See how you fare in the general knowledge quiz given below.

Ratings: 1-3 Poor, 4-5 Fair, 6-7 Excellent

- 1) What is an alligator's natural habitat?  
a) Seas  
b) Rivers  
c) Rivers and seas
- 2) How many trunk fingers does the African elephant have?  
a) Two  
b) Three  
c) One
- 3) What does the term 'ursine' mean?  
a) Bearlike  
b) Doglike  
c) Catlike
- 4) Which US state is home to Yosemite National Park?  
a) Texas  
b) Arkansas  
c) California
- 5) Who wrote *The Jungle Book*?  
a) Gerald Durrell  
b) Rudyard Kipling  
c) Ernest Hemingway
- 6) Which mammal has venomous spurs on the ankles of its hind legs?  
a) Koala  
b) Walrus  
c) Duck-billed platypus
- 7) Bracken Cave in Texas is home to the largest colony of \_\_\_\_ in the world.  
a) Bats  
b) Bears  
c) Raccoons

platypus, 7. a) Bats

BBC Knowledge Quiz, 1. Rivers, 2. Two, 3. a) Barrier,

Monarchs, 5. 4. Acknowledged, 6. Homeric

Pick & Choose: 1. Chameleons, 2. Lions, 3. Drangonflies,

A sponge, 5. A stamp.

Brain Teasers, 1. and drew = Andrew 2. One entered at ATM

the other is TPL, 3. 17 rupee coins and 10 fifty paise coins 4

Double Barrelled: Bare

Qmata, Roddie, Ardent, Dancke, Erand, Neclar,

Enigma Code: Carrot, Ardent, Dancke, Erand, Neclar,

Head & Tail: Long-Bow-Down-Cast-Iron-Fist-Fight-Back

Makhamta Gaddi -

a nation can be judged by the way its animals are treated.

Scramble: Adage, Seline, Nubile, Macaron. The greatness of

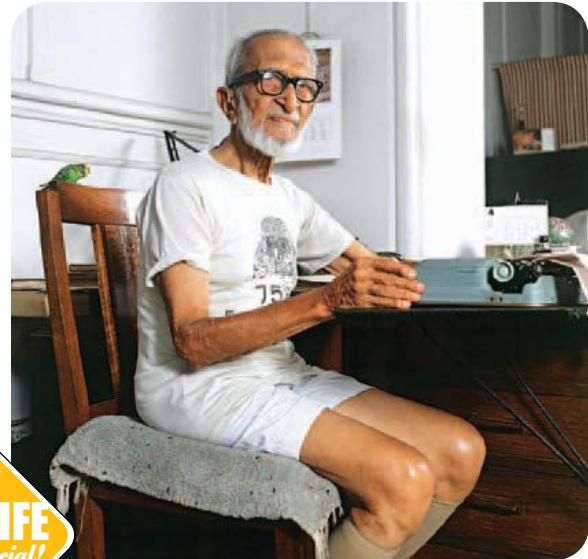
highminded, notebook, star, toothbrush

commune, fadis, farther, fountain, gorilla, guava, idli,

picture search: Ball, boat, bookshelf, cheese, cottage,

Solutions:

# IN FOCUS



## DR SALIM ALI

12 NOVEMBER, 1896 – 20 JUNE, 1987

No one has contributed as much to avian conservation in India as ornithologist Dr Sálim Moizuddin Abdul Ali

**H**E started off as a bird *shikari* (hunter). To be fair, he was a 10-year-old then and probably didn't know any better, but he did do a complete 180-degree. The uncommonly coloured bird he shot down with his toy air gun was identified by then secretary of the Bombay Natural History Society (BNHS) WS Millard as a yellow-throated sparrow. Millard then showed the young boy the society's collection of stuffed birds, igniting Ali's curiosity and setting him on the path to being hailed as the Birdman of India.

Such a reputation did not come easy. He did ruffle a few feathers along the way. He was known to be a strict disciplinarian when working in the field. He had frequent

clashes with the BNHS regarding his employment as their bird guide, effectively leaving him without a job at one point. Then, there was that fight to save the 100-year-old institution from closure; he wrote a letter to then Prime Minister Pandit Nehru asking for funds, which were granted. He took to educating the local population about the need for conservation and went on to usher in a more systematic approach of identifying and studying birds, among others. Dr. Ali spread his wings to reach every swamp, grassland and hilltop region in the country to study birds. The result: his magnum opus, the 10-volume *Handbook of the Birds of India and Pakistan*, written with Dillon Ripley, which is still referred to as *the* bird handbook.

Several of India's undisturbed biospheres are now protected national parks and sanctuaries thanks to the considerable influence Dr Ali had on the then government. The Keoladeo Ghana National Park (Rajasthan) and the Silent Valley National Park (Kerala) are examples. He was awarded the Padma Bhushan and the Padma Vibhushan in 1958 and 1976 respectively.

### \* FACTS

- The Himalayan forest thrush (*Zoothera salimalii*) is the fourth bird species to be discovered in India since 1947. It is the first Indian bird to be named after Dr Salim Ali (pictured, below left).
- Dr Ali was the first to spot the Siberian crane in 1936 – he promptly shot one and ate it!
- The world-famous Keoladeo Ghana National Park is home to nesting storks, herons, spoonbills and ibises as well as hordes of migrant bird species like the magnificent Siberian crane, which flies 3,000 miles in winter to reach the sanctuary and is an endangered species.





# Knowledge