BBC
MARCH 2017

EXCLUSIVE! STUNNING REVELATIONS ABOUT HUMPBACK WHALES IN SCOTLAND

PLUS BLOGGER OF THE YEAR WINNERS!
Page 50

Wildlife

March 2017 Volume 35 Number 3

Yorkshire triangle
Introducing a rich new wildlife area

DIPPERS
The astonishing way these birds hunt underwater

WORMS
Never found them interesting? You will now!

Happy hogs
How more than 31,000 got a helping hand last year

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NICK BAKER
Secrets of a sea creature we all tend to overlook

KING COBRA
Peculiar goings-on with these legendary snakes

WORLD LAND TRUST

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Photos: David Bebber, David Tomlinson, NCEcuador, Roberto Pedraza Ruiz




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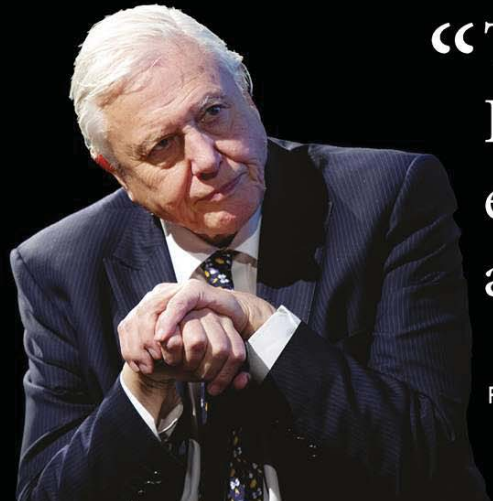

"The money that is given to the World Land Trust, in my estimation, has more effect on the wild world than almost anything I can think of."

Sir David Attenborough

Registered charity: 1001291

Richard Shucksmith

Welcome...

There was a lot of excitement in the *BBC Wildlife* office when we heard from Shetland-based naturalist and tour guide Brydon Thomason about the recent amazing encounters he and his colleagues Richard Shucksmith and Peter Hunter had with five humpback whales off the Scottish coast. We were close to our press deadline, with a lot of pages finished, but when we saw the superb pictures and read the account we had to pull out all the stops to make space and share the story (p46). The fact that the trio's encounter later resulted in a first for Britain made it all the more thrilling.

The second exciting event to occur in the preparation of this month's issue was the arrival of the Blogger of the Year Award results from our independent judges. The worthy winner garnered the most votes from our panel of four for her informative and humorous blog about wildlife she observes at home and abroad. Her identity is revealed on p50.

Sheena Harvey Editor
sheena.harvey@immediate.co.uk

Contributors

NICK BAKER
Naturalist and TV presenter Nick is thrilled by life's minutiae. In his new column he discusses barnacles. "Never is the excitement as great as when the surprises are close to home," he says. **See p11**

GRAHAM APPLETON
Writer Graham shares the joy of recapturing the sound of birdsong with his new hearing aids. He says, "The full richness of a robin's song immediately brought a smile to my face." **See p30**

HELEN PILCHER
Helen had her preconceptions about earthworms smashed after spending time with a worm expert. "They're not boring and brown," she says. "Earthworms are the unsung superheroes of the animal kingdom." **See p38**

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Post *BBC Wildlife Magazine,* FREEPOST LON16059, Sittingbourne, Kent ME9 8DF
Subscriptions UK £51.87; Republic of Ireland £49; Europe £49; Rest of World £54

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abc Jan–Dec 15 total **35,934**
NRS Apr 14–Mar 15 **241,000**

ON THE COVER: Jackal: Janez Tarman; warbler: Andy Rouse/2020VISION/NPL; sloth: Suzi Eszterhas; sea stars: Audun Rikardsen

CONTENTS March 2017

SPECIAL OFFER
SAVE
WHEN YOU SUBSCRIBE
SEE P44

20
Northern gannets are among the throngs of seabirds thriving in Yorkshire's nature triangle

Wild

Features

38 Take a closer look at worms

Agenda

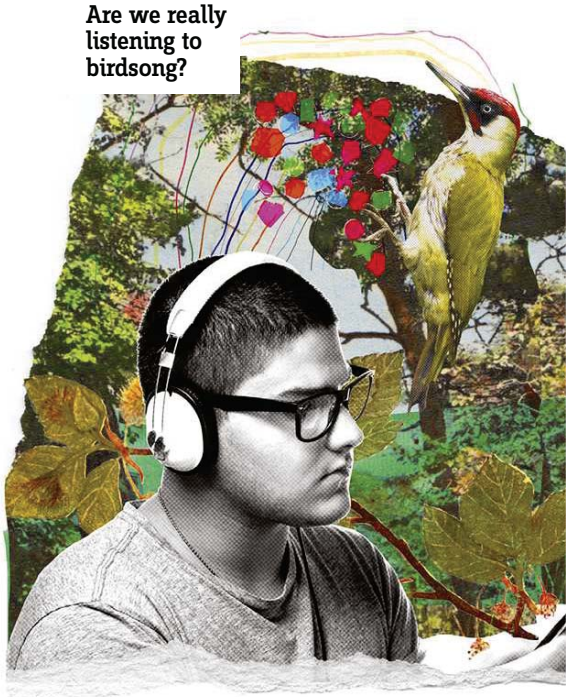
74 The majestic and deadly king cobra

66 New challenges for the fantastically adapted dipper

80 Bright and beautiful images of life on coral reefs

Every month

30 Are we really listening to birdsong?



Gannets: Steve Race; dipper: João Cosme; cobra: Oliver Born/Biosphoto/FLPA; coral: Alex Mustard; illustration by Michelle Thompson/Handsome Frank; worm: MYN/Dimitris Poursanidis/naturepl.com

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Printed by William Gibbons Ltd.

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WILD MARCH

WHAT TO SEE » WHERE TO LOOK

Wind composition by Valter Binotto was the winning image in the Plants and Fungi category of Wildlife Photographer of the Year 2016. Coppiced hazel can produce amazing catkin displays in spring – and some of the biggest crops of hazelnuts in the autumn.

Valter Binotto

240 The average number of male flowers on a single hazel catkin. Each grain of pollen they produce has a one in 250,000 chance of successfully fertilising a female flower.

CHRIS PACKHAM'S MUST-SEE

BEHAVIOUR

BLOWING IN THE WIND

Glowing with a stirring of early spring sunshine, hazel catkins dance on the breeze and shower sparks of pollen into the sky. At the same moment, two bud-like female flowers, their vivid red tufts visible in the top-centre of Valter Binotto's award-winning image, await the arrival of this life-generating golden rain.

Hazel is monoecious, meaning both male and female flowers are found on the same plant, although pollen must be transferred between different trees for fertilisation to take place. The male catkins, or inflorescences, hang like clusters of catatonic caterpillars from mid-February (or earlier in more sheltered, lowland areas), appearing ahead of leaves, so the wind can disperse the millions of microscopic pollen grains more easily.

Recent research from the University of Life Sciences in Poland suggests that early emerging bees also play a role in pollination. While catkins don't actively attract insects with nectar, their structure allows bees to collect pollen from them. The crimson stigmas may then entice bees to land on the female flowers and transfer pollen in the process. And for the bees, hazel pollen provides an important source of energy at a time when there are few available alternatives.

GET INVOLVED Record the appearance of catkins and other signs of spring in the Nature's Calendar survey **http://bit.ly/2j4o2f5**

> TWO BUD-LIKE, RED FEMALE FLOWERS AWAIT THE ARRIVAL OF THIS GOLDEN RAIN.

SPARROWHAWK

DISPLAY FLIGHTS

These stealthy hunters usually keep a low profile, sticking close to cover as they stalk their feathered prey. But in early spring sparrowhawks engage in aerial acrobatics above newly selected nesting territories. To assert their claim to the area, birds soar and wheel overhead on outstretched wings, then swoop and climb again before ending the show with a spectacularly steep dive. These rollercoaster displays are performed by both sexes, but being 25 per cent larger than the males, females are more visible, and are often mistaken by eager birders for goshawks.

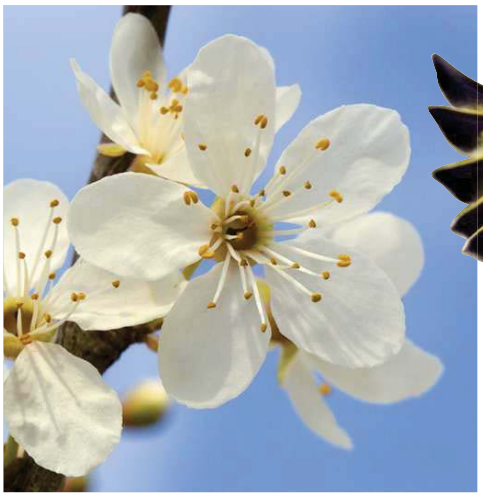
TOP TIP Spot displaying raptors by scanning the skies above woodland on still, sunny afternoons.

BLACKTHORN

SPRING SNOW

When blackthorn bursts into life at the beginning of March, turning whole hedges white with blossom, you'd be forgiven for thinking that there had been a late sprinkling of snow. The five-petalled flowers packed closely together on the bare twigs of this familiar hedgerow shrub – also found along woodland edges – provide a valuable source of nectar for early emerging bees, hoverflies and other insects.

GET INVOLVED Learn about hedgerow management at **www.hedgelink.org.uk**



UK HIGHLIGHTS

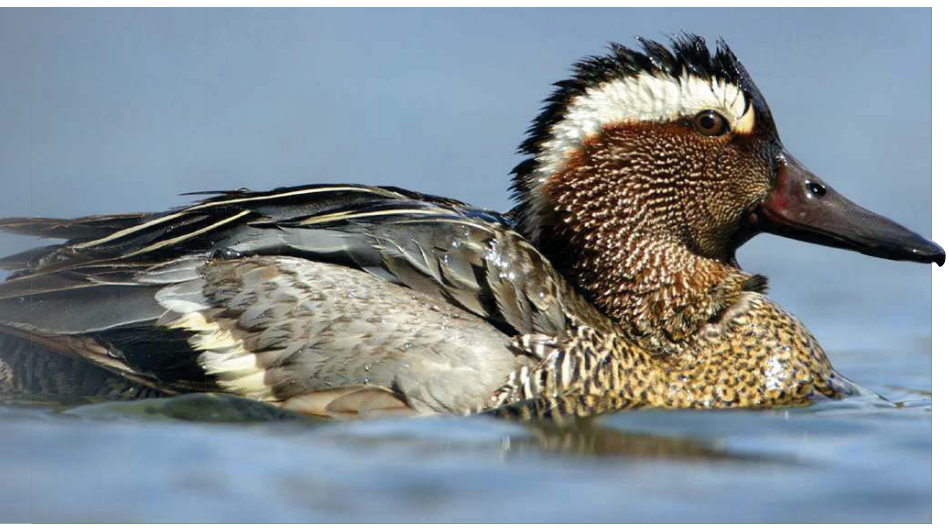
The essential wildlife events to enjoy this month, compiled by **Pete Dommett**.

GARGANEY

TWO LITTLE DUCKS

Our only summer migrant ducks, garganeys arrive this month in twos, having paired up on wintering grounds in sub-Saharan Africa. Sightings of this small species (between teal and mallard in size) are unpredictable, but search quiet lakes in the south and east of England for handsome drakes – identified by white eye-stripes – and their muted mates. Some are en route to breeding grounds in north and east Europe; a tiny population of fewer than 100 pairs stays to nest in the UK.

GET INVOLVED Send sightings of spring migrants to the BTO at **www.birdtrack.net**



Sparrowhawk: Oliver Smart; siskins & bumblebee: David Whitaker; marigold: Dave Kilbey; saxifrage: Colin Varndell; bee-fly: John Bebbington; garganey: Steve Round; blackthorn: Alex Hyde

SISKIN

FINCH FEST

Siskins have cashed in on our love of putting food out for the birds as much as any other species, and now are frequently seen at garden feeders up and down the country. These pretty finches visit year-round, but numbers usually peak in March as birds fuel up before heading to breeding areas. They may stay to nest in gardens with tall conifers, however. Siskins are smaller and daintier than similar-looking greenfinches, though will dominate birdfeeders and threaten larger species with open-winged displays of aggression.

GET INVOLVED Join the BTO's Garden BirdWatch project: **www.bto.org/gbw**

MARSH MARIGOLD

GOLDEN GLORY

As its common name suggests, marsh marigold flourishes in wet woodland, water meadows and ditches, and flowers from now until July. It is also known as 'kingcup' – large, golden sepals (it lacks petals) give it the look of a luxuriant, super-sized buttercup. The glossy green, kidney-shaped leaves have a waxy feel, but can irritate skin, so – as with all treasure – it's best to look and not touch.

GET INVOLVED Take part in the UK's National Plant Monitoring Scheme: **www.npms.org.uk**

GREATER BEE-FLY

SUPER FLY

Is it a bee? Is it a fly? *Bombylius major* causes confusion, and even alarm, when it's spotted in gardens at this time of year. Its furry brown body and the way it hovers with a high-pitched whine fools would-be predators – and many people – into thinking it belongs to the Apidae (bee) family, but the single pair of dark-edged wings identify it as a true fly (bees have two pairs). And that long 'stinger' at the front of its body is the insect's proboscis, used for drinking nectar from low-growing spring flowers such as primroses; it may look vicious but it is perfectly harmless.

FIND OUT MORE Watch Miranda Krestovnikoff find out more about bee-flies: **www.bbc.co.uk/nature/life/Fly#p01crtcb**

ALSO LOOK OUT FOR...

BOMB SITES

A small species of the *Bombus* genus, early bumblebees have distinctive ginger tails and one or two yellow bands around their shaggy-haired bodies. Those seen in gardens this month are queens foraging or prospecting for suitable nest-sites – compost heaps and old birds' nests may be used.

OLD YELLER

The brimstone is the longest lived of our native butterflies and can survive for up to 11 months. Adults on the wing in March emerged last August then hibernated through the winter. Bright, sulphur-yellow males (females are paler) are often seen flitting along roadside verges from now until June.

SIGNATURE SONG

They might be beaten back to Britain by sand martins or wheatears, but chiffchaffs are the first of our spring arrivals to sing. Their eponymous, two-tone chime is the most reliable way to distinguish these olive-green warblers from superficially similar willow warblers.

LIQUID GOLD

Wherever there is running water, there's a good chance of finding opposite-leaved golden saxifrage. Look for the tiny (3–5mm) yellow-green flowers and paired, rounded leaves that form creeping mats on damp riverbanks and sheltered streamsides. This moisture-loving plant is widespread in Britain, but most common in the west.

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Hidden BRITAIN

NICK BAKER

REVEALS A FASCINATING WORLD OF WILDLIFE THAT WE OFTEN OVERLOOK.

ACORN BARNACLE

Have you ever considered barnacles other than when one skins your knees or makes you dance painfully, barefoot across intertidal rocks? These little crustaceans get ignored by most of us. If we see them at all, they're out of the water and closed up – a small, mysterious capsule of calcium that gives away few clues as to what actually lives inside.

Within each tiny turret is an intertidal survival specialist able to tough out the harshest of conditions, by trapping a bubble of seawater in its fortress of perfectly interconnecting plates when the tide retreats. Superficially, a barnacle looks like a limpet; many mistakenly think that they are molluscs. But look closely at barnacles underwater and you'll see something that no mollusc has: jointed legs.

Next time you're at the seaside, take a small barnacle-encrusted object, immerse it in a jar of seawater and hold it up to the light – you'll see the two perfectly fitting pairs of valves in the middle slide open enough to reveal six pairs of feeding legs, called cirri. These seem to grab rhythmically at the nothingness of the water and retreat, but what they're in fact doing is snatching fragments of microscopic life from the water and pulling them into the animal's hidden mouth.

Britain has a dozen or so barnacle species, each found in slightly different environments.

DID YOU KNOW?

Darwin was a fan of barnacles. He dedicated eight years of his life to studying them, from 1846 to 1854.

Shrimp-like beginnings

The 19th-century biologist Louis Agassiz nicely summed barnacles up as: "nothing more than a little shrimp-like animal standing on its head in a limestone house kicking food into its mouth". Which is pretty much what they are. Barnacles start life looking much more like shrimps than the familiar adult stage. They develop as eggs inside their parent's shell, then are ejected into the wide world as soon as they hatch. Each free-swimming planktonic larva is called a nautilus.

The larvae make the most of the seasonal abundance of plant plankton and, as Darwin pointed out in his seminal work on barnacles, this stage is analogous to the caterpillar stage of a butterfly's lifecycle. The larvae feed and grow over the next few weeks, moulting as they do so.

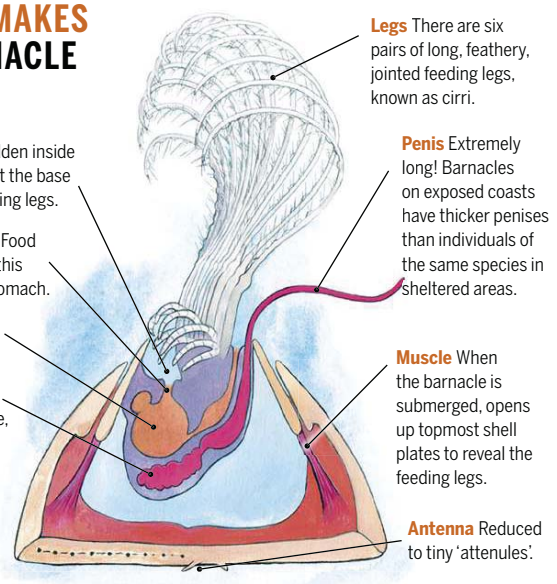
Sometime in April, the larvae stop feeding and moult into another form, the cypris larva, and each has 13 days to find a spot to settle for life. When it does, it immediately glues itself upside down using glands on its antenna, and starts to concentrate calcium salt from the seawater to built its house.

Barnacles continue to grow once settled, which is why, if you look at a colony on a rock, they come in different sizes. By adding calcium and proteins to the base and inside, the whole structure of the shell slides outwards to accommodate the growing barnacle within.

If you study your barnacles long enough, you might see another claim to fame – the proportionally longest penis in the animal kingdom, 8–9 times the length of its owner. If you need to mate and are glued to the spot, then you need a fairly neat solution. The human equivalent would be a man impregnating his neighbour via the letterbox.

NICK BAKER
is a naturalist, author and TV presenter.

WHAT MAKES A BARNACLE TICK?



Illustrations: Peter David Scott/The Art Agency

NATURE RESERVE SPOTLIGHT

RSPB COOMBES VALLEY

WHERE
Leek,
Staffordshire, ST13 7EU

WARDEN
Paul Bennett

WHY YOU SHOULD VISIT

Visit RSPB Coombes Valley to experience spectacular views from our viewpoints across a beautiful frosty wooded landscape.

WHAT YOU CAN SEE

March is an excellent time of year to spot large flocks of fieldfares and redwings, and if you're lucky you may hear a lesser spotted woodpecker. The reserve is also home to willow tits that regularly visit our feeding stations – the Red Listed species is declining fast in the UK.

TOP WILDLIFE SPOT

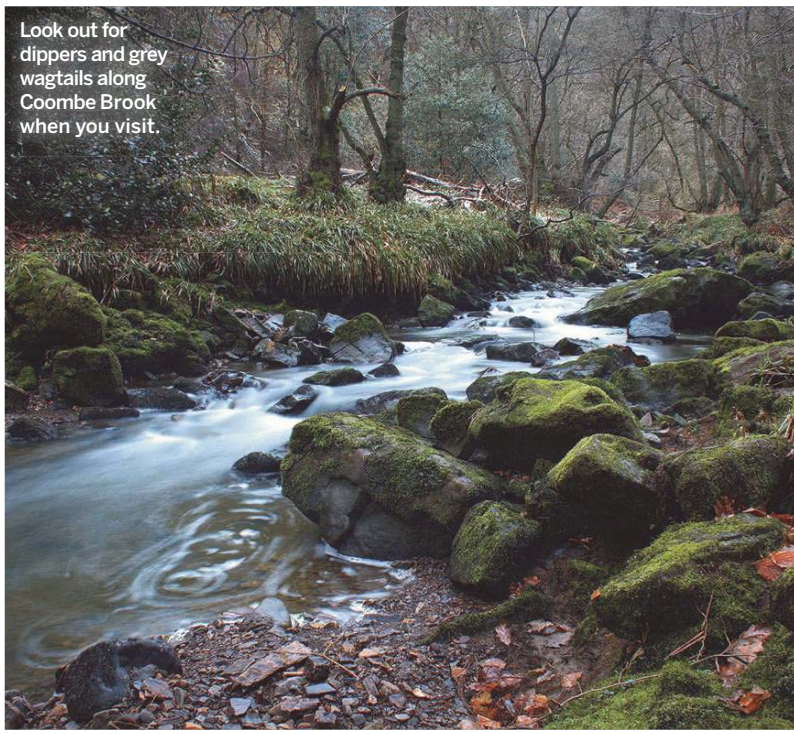
In 2016 we opened a new walkway on the reserve. It's a fantastic feeling being whisked up into the canopy on a bouncy rope bridge – my children love it!

JOIN ITS EVENT

Join us on 5 March for a guided walk in nearby Churnet Valley to see Bellpit Meadows. An adult ticket costs £5, child £2.50.

HOW TO VOLUNTEER

We rely on help from our fantastic volunteers to run events and our visitor centre. People can also get involved in habitat management on the reserve. Find out more at http://bit.ly/2hM2Vtb



Look out for dippers and grey wagtails along Coombe Brook when you visit.

MARCH WILDLIFE EVENTS

25 Mar

WWF EARTH HOUR

Now in its tenth year, this annual World Wildlife Fund event takes place across at least 178 countries and territories. To take part you need to turn off your lights for an hour at 8.30pm to show your support for the future of the planet and awareness of climate change.
http://bit.ly/2igcosN

1 Mar

ADULT SHORESEARCH

Join Yorkshire Wildlife Trust staff at 11am to search for weird and wonderful rockpool creatures, including anemones, fish and crabs in this adult only event. Tickets cost £5 (non-member) or £3 (member). Booking is essential.
http://bit.ly/2gE6Qbd

24-26 Mar

WILD FILM FESTIVAL SCOTLAND

EVENT CHOICE

This new event in Dumfries will feature award-winning natural history films, amazing wildlife photography and celebrity speakers such as Iolo Williams. See the website for ticket information.
http://bit.ly/2gc6NmS

10-19 Mar

BRITISH SCIENCE WEEK

This year British Science Week (BSW) has a penguin theme. You can get involved by annotating images of penguins for a citizen science project called Penguin Watch. The data you collect will help improve our understanding of these birds.
http://bit.ly/1UbxYz3

SPEAKERS' CORNER
JOHN WALTERS

WHAT The Wildlife of Devon

WHEN 7.30pm on Monday 27 March

WHERE West Charleton Village Hall, Devon

Local naturalist John Walters will be revealing in this talk the amazing variety of wildlife found on moorlands and along coastlines in Devon through field sketches, photographs and video clips. The illustrator was interviewed during an episode of BBC One's *The One Show,* which featured the rufous grasshopper. He will be sharing his knowledge of this species and others during the evening. "The rufous grasshopper is quite rare locally, and has a beautiful courtship display," he says. Kingsbridge Natural History Society members can attend for free and tickets cost £3 for non-members.

John illustrated The Wildlife of Dartmoor *by Norman Baldock. For more information on his talk visit: http://bit.ly/2kmXMxg*

Paul Bennett: Mel Brown; Coombe brook: Simon Gray; Earth Hour: iStock; adult shoresearch: Anthony Hurd; red squirrel: Keith Kirk; Penguin Watch: Heath van Singel and Zooniverse; J Walters: J Walters

UMPHAFA PRIVATE NATURE RESERVE

THE UMPHAFA PRIVATE NATURE RESERVE IN SOUTH AFRICA WAS ESTABLISHED IN 2005 BY COLCHESTER ZOO'S CHARITY, ACTION FOR THE WILD.

Following extensive measures to rehabilitate the habitat and recreate much of the region's former species assemblage, the reserve is now managed as a conservation area exclusively for the research of African flora and fauna and as a centre for environmental education.

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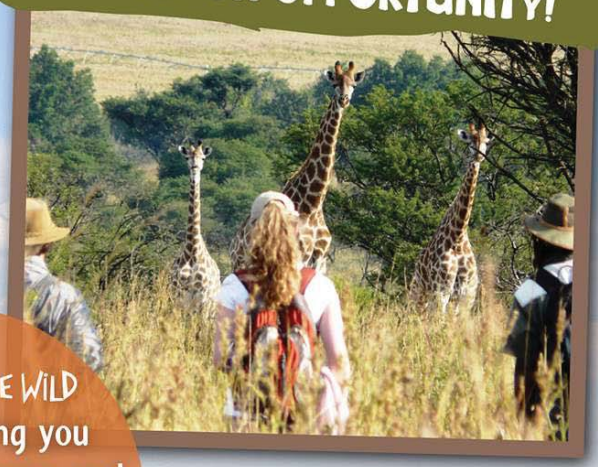

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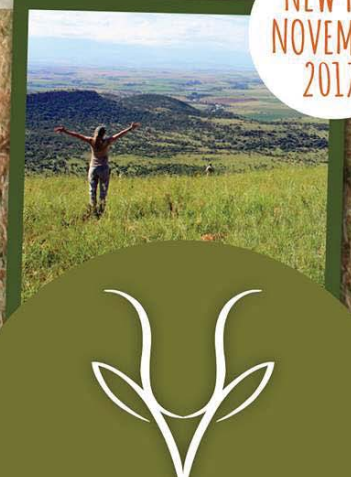

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DISCOVERIES

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Written by
STUART
BLACKMAN

Rhesus macaques 'talk' using coos and grunts, gestures and facial expressions.

PRIMATES

IF ONLY THEY COULD TALK...

MONKEY VOCAL TRACTS ARE SPEECH-READY, ACCORDING TO NEW RESEARCH, SO WHAT'S STOPPING THEM?

It's something of a tragedy that we cannot converse with our primate cousins. With so much in common, there would surely be plenty to talk about.

It has long been pondered why our closest relatives are incapable of speech. And, according to new research, one fashionable possibility can now be ruled out.

There are two broad explanations to account for non-human primates' lack of conversational skills. One is that their vocal tracts cannot form the variety of sounds required. The other is that their brains and nervous systems are not wired up to control the sounds.

The new study analyses the anatomy of the vocal tracts of rhesus macaques and finds that their larynx, vocal chords, mouth and tongue should be quite capable of producing the range of vowel and consonant sounds required to mimic human speech.

Tecumseh Fitch of the University of Vienna, who led the research, told *BBC Wildlife* that he would expect great apes to be even more suited to speech – anatomically, at least. "Apes have better and more voluntary control over their vocal tract – lips, tongue and jaws – than monkeys," he explained.

It remains far from clear, though, precisely what their nervous systems are lacking. Let's suppose, for example, that it's possible to provide a primate with the wiring required to finely control its vocalisations. Would it then be able to speak?

"If you just gave it the wiring for vocal control, it could mimic words and imitate sounds, like a mynah bird or parrot – which no monkey has ever done – but not 'speak its mind'," said Fitch.

That's because language also requires other complex neurological circuitry before a real conversation is possible.

"I'm sure monkeys would have lots to say if they had the full package of speech, syntax and semantics that underlies language," said Fitch. "All the cognitive work shows that monkeys know a lot about the world: about other monkeys, about food, about locations, etc. But that would require more than just vocal control."

DID YOU KNOW?

■ You can hear a computer simulation of what a talking macaque would sound like, on the basis of the acoustic properties of its vocal tract, compared with a human voice at http://bit.ly/2k3G5i8

SOURCE: *Science Advances*
LINK: *http://bit.ly/2jbluak*

robin chittenden/Alamy

BIRDS

BLADE RUNNERS

A new study in the Baltic Sea shows that offshore windfarms are dangerously attractive to migrating raptors.

Little is known about the risk of bird collisions with turbine blades. Many seabirds don't fly high enough to be threatened, but others – gannets, for example – are more vulnerable.

There is also concern for soaring migrants such as raptors and storks, which tend to island-hop across large expanses of water. Are they similarly drawn to windfarms?

Using radar to track raptors migrating between Denmark and Germany, biologists led by Henrik Skov, senior ecologist at Danish Hydraulic Institute (DHI) in Denmark, have shown that they are inclined to alter their flightpaths towards the turbines.

Skov told *BBC Wildlife* that there are three options for mitigating the collision risk.

"Deter the raptors when approaching the windfarm; close down part, or the entire, windfarm as raptors approach, or take migration corridors into consideration at the planning stage."

Turbine blades present a danger to raptors such as buzzards.

SOURCE: *Biology Letters*
LINK: http://bit.ly/2jCdW4V

Manta rays feed at greater depths than previously realised.

FISH

DEEP, DARK SECRET

Giant manta rays are usually portrayed gliding elegantly through sunbeams filtering through shimmering surface waters. But new research shows they have a deeper, darker side, too.

Very little is known about the diet of these huge fish, which can reach 7m across. To find out, biologists have taken tissue samples from free-swimming mantas off the coast of Ecuador, using a biopsy punch mounted on a hand-spear.

An animal's tissues contain chemical signatures derived from its prey, allowing the biologists to estimate that surface plankton comprised only 27 per cent of their diet. The rest was from the mesopelagic zone at depths of 200-1000m.

"The mesopelagic zone is the next frontier for open ocean fisheries," write the scientists. "It is concerning that we still do not fully understand the reliance on this zone by marine megafauna that already face threats in well characterised surface habitats."

SOURCE: *Royal Society Open Science* LINK: http://bit.ly/2jrf6hn

Manta: Getty; Axolotl: Jane Burton/naturepl.com; buzzard: Alan Williams/naturepl.com; flatworm: Ilana Rossi

The EXPLAINER

Scientific terms put into plain English for the rest of us.

NEOTENY

Most juvenile animals aren't simply miniature adults. Rarely is this more obvious than among amphibians – think of a tadpole and a frog. Sometimes, though, youthful characteristics are retained into adulthood. In the axolotl, an aquatic Mexican salamander, adults are essentially sexually mature tadpoles. Neoteny can also be seen in flightless female glow worms, which are much like their larvae. Humans' large heads may be a neotenous development to make space for our big brains.

The adult axolotl, also known as the 'Mexican walking fish' remains much like a tadpole.

This is just one of three new species of flatworm discovered in Brazil.

NEW SPECIES SPOTLIGHT

CRATERA AUREOMACULATA

WHAT IS IT? Named after its resplendent gold (aureus) and spotted (maculate) markings, this is one of three new species of terrestrial flatworm described from Brazil. It is 55mm long, active at night among leaf litter and probably hunts other invertebrates.

WHERE IS IT? All three species were found in southern Brazil's Araucaria forests, which are dominated by trees similar to the familiar monkey puzzle. The forests are considered a hotspot of flatworm diversity and many species are thought to await discovery.

SOURCE: *ZooKeys*
LINK: http://bit.ly/2jbUlQk

Conditioned dolphins are more likely to be injured in boat collisions (*inset*) or by fishing gear.

CETACEANS

DO NOT FEED THE DOLPHINS

Conditioning dolphins to humans is an effective way for people to encounter a wild cetacean up close, but it's not so good for the dolphins, according to new research.

Drawing on more than 45 years-worth of data from Sarasota Bay in Florida, biologists have found that bottlenose dolphins conditioned with offerings of food are more likely to be injured in human interactions – boat collisions, for example, or entanglement with fishing gear – compared with unconditioned animals.

Fredrik Christiansen of Australia's Murdoch University told *BBC Wildlife*: "I cannot see any benefits from the animals' perspective in being provisioned, apart from short-term energetic gains. However these are not likely to be substantial enough, or even needed, to enhance survival and/or reproduction."

The proportion of conditioned dolphins in Sarasota Bay has nearly tripled in the last decade, and Christiansen says the time has come to stop to the handouts.

"There are laws forbidding food provisioning, but some people still carry out these activities, meaning enforcement is needed," he said.

SOURCE: *Royal Society Open Science*
LINK: http://bit.ly/2jbMXK7

INSECTS

SKY FULL OF INVERTEBRATES

The painted lady butterfly is a long-distance migrant.

Biologists have recorded a staggering volume of insect life in the skies above Britain. The 10-year study, which used radar to track insect movements at heights above 150m, reveals that about 3.5 trillion insects fly over southern England each year. That's nearly eight times the biomass of the 30 million songbirds that migrate between the UK and Africa.

Numbers peak in spring and autumn, when the prevailing direction of travel also corresponds with that of migrant songbirds.

"It's basically a seasonal migratory event that results in a redistribution of the population," Jason Chapman of Rothamsted Research in Hertfordshire told *BBC Wildlife*. "Our work shows there are hundreds, if not thousands, of migratory insect species we didn't know about.

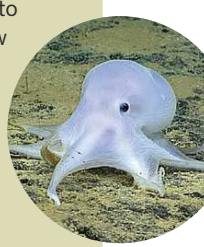
"It's as if we'd just discovered that our songbirds are migrants. I mean, there was a time when it was thought that swallows hibernated on the bottom of ponds."

SOURCE: *Science* LINK: http://bit.ly/2jrzPS7

WILDLIFE UPDATES

DEEP TROUBLE

A Hawaiian octopus discovered last year (*BBC Wildlife*, May 2016) has very particular habitat requirements. According to *Current Biology*, it attaches its eggs to sponges that grow only on mineral nodules, which are attractive to mining companies.



TAILS OF THE UNEXPECTED

Defence against predators may not be the chief reason that lizards drop their tails. *Animal Ecology* reports that, for two species of Mediterranean gecko, tail-loss rates are highest among dense populations on islands with no predators, suggesting it has more to do with aggressive disputes between rivals.

AMBER ALERT

Evidence for feathered dinosaurs doesn't get much firmer than a tail preserved in amber with fine primitive feathers. The 99-million-year-old fossil from Myanmar is described in *Current Biology*.

POISON OR PANACEA?

A hormone in platypus venom could be used to treat diabetes, according to *Scientific Reports*. GLP-1 is produced by mammalian intestines to regulate blood sugar levels, but breaks down too quickly to be of medical use. The platypus venom version, though, decays more slowly.

Tourists: Reinhard Dirscherl/Alamy; injury: Sarasota Dolphin Research Program; butterfly: Getty; octopus: Courtesy of NOAA Office of Ocean Exploration and Research, Hohonu Moana 2016; platypus: Dave Watts/Alamy

A female of Marsican Bear exploring the Ernici Mountains with her cub. Photo: Francesco Culicelli

Sandrino, a male Marsican Bear, looks placidly into the camera. Photo: Gaetano de Persiis

MEET THE RAREST BEAR IN THE WORLD

Central Italy is the last den of the Marsican Bear. Today a British charity is fighting for its survival

SAVE THE BEAR

Unknown to most outside of Italy, the Marsican Brown Bear is on the brink of extinction and it is listed as Critically Endangered on the Red List of the International Union for Conservation of Nature (IUCN). This subspecies of European brown bear has lived in the isolation of the Apennine Mountains of Central Italy for over 500 years. These magical bears are smaller, friendlier and whilst omnivorous, maintain a mainly vegetarian diet.

Although they once used to populate the Appennines of Central Italy, the loss of habitat, poaching and human interference by means of livestock contagion have decimated the population. Within the last four decades, 93 bears have died and more recently car accidents have further decreased their number. The latest genetic census has traced fewer than 50 individuals remaining in the 200 square mile territory of the Abruzzo, Lazio and Molise National Parks.

Today, The Anglo-Italian Society for the Protection of Animals (AISPA), in co-operation with the Italian wildlife organisation "Salviamo l'Orso" (Save the Bear), is fighting against time to raise awareness and to ensure the survival of the species, which exemplifies the bio-diversity of the European continent. With a history dating back to the 19th century, AISPA is a British based charity which raises funds worldwide in support of grassroots animal welfare projects in Italy.

Within the last few years, AISPA has been working alongside Salviamo l'Orso and its passionate conservation volunteers on a range of different projects. The main aim has been to prevent human-bear conflicts and on implementing stray and working dog inoculation programmes, in order to avoid the spread of life-threatening diseases to the bears.

Like many scientists and conservationists, the charity believes that in this virtually unknown, yet stunning region of Italy, there are the right environmental conditions to ensure the survival of this unique wildlife symbol of the Central Apennines. With you financial support AISPA can work to enable the rarest of bears to survive in the National Parks of Central Italy.

Emerging from the forest in the Abruzzo National Park. Photo: Mario Novelli

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COLIN PACKHAM

Chris introduces his greatest hero – a humble, loving father who instilled an unfailing drive to never give up.

I remember a series of Sunday mornings collecting food for my lizards. I remember sitting on the collapsed carcass of a Dutched elm, watching him peel back the bark and scrabble to squeeze spiders into a jam jar. Shirt, no tie – it was Sunday after all – but still with that trademark sense of purpose, of focus, of a job worth doing... and doing well.

My pause was brief – I didn't want to be caught slacking. I never feared his frowns, nor feared him, but I knew if I didn't strive to succeed, to fumble more 'bugs' into my jar, then when they were measured I'd be found wanting. (He still got twice as many spiders as me.)

The wasteland we scoured was in Woodmill Lane. He knew its history, having grown up within spitting distance; it had been a brickworks and a sandpit. He remembered seeing snakes swimming in a pool there when he'd been my age in the 1940s. Now it was a bramble patch, a sun-baked bowl necklaced by the fallen trunks of the roadside giants that I had seen reeling with winter rooks as we'd trudged up that hill when I first started school.

I longed for the riches of his 'snake-world', not knowing that within 10 years I'd be fighting, and losing, my first conservation battle to save this scrap of wasteland from 'development'. They called it 'Badgers Wood Place' in pure spite of the setts they destroyed to build it.

For him, knowledge was paramount. Knowing things, and knowing how those things connected, made a greater sense in time or space, in history or geography, in maths and physics, in BTUs or horsepower. He was an engineer – he understood how things worked, about electricity, energy and the machines that made or used them – but he also understood the relevance of every war, battle and vainglorious last stand.

Now, though, he had a new challenge: to embrace zoology. So we went to the library every Saturday, the only difference being that he expected me to teach him, and tell him about the dinosaurs, the amoebae, the birds, the mice, the tadpoles we dredged from ponds each spring. He was, he said, the 'gillie' – he bought a deerstalker hat and carried a self-cut stick on our expeditions. He found most of the nests, the footprints, his keen eyes fixed on the specks in the sky that I had to turn into birds.

And I tried hard, and harder and then harder still to know all these things. But there was no end, when we exhausted the old brickfields we walked further, then drove, then drove further, out to the New Forest, the heaths, the downs, the rivers, streams and lakes where new life led to new questions and needed new answers.

Together we built the foundations of a new knowledge, still spattered with Agincourt, Waterloo, *HMS Victory* and Spitfires, but coloured by ecology, ethnology, physiology and anatomy. His machines were matched by my wildlife. So when we almost stopped talking because the Sex Pistols and The Clash were shouting louder than either of us could, when things got strained, hectic and dysfunctional, we still had a vestige of common ground...

> "NOW, THOUGH, HE HAD A NEW CHALLENGE: TO EMBRACE ZOOLOGY."

what we didn't know. We still trudged with jars and nets, him with the deerstalker, me with slightly better binoculars; we still read and told each other new things. We still do.

The recent photo opposite was taken on a Sunday. I knew he wouldn't be wearing a tie so I am. It's not revenge, it's an ultimate homage, because of all the heroes I've worshiped here... there can be only one. My Dad.

Like father, like son... Chris with his ultimate hero.

Charlotte Corney

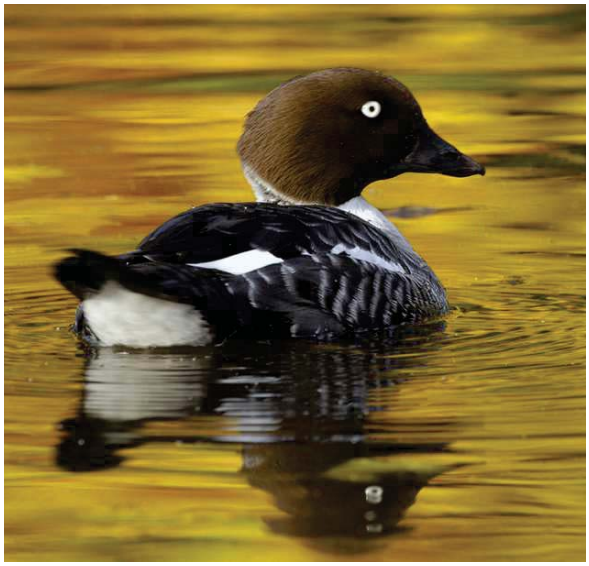
CHRIS PACKHAM
is a conservationist and presenter.
● This is Chris's last Unsung Heroes column. He returns with a new column in the Spring issue (on sale 12 April).

YORKSHIRE'S **NATURE** TRIANGLE

Some may say rhubarb to marketing a wildlife destination based on a shape, but there's nothing crumbly about this area of East Yorkshire, says **James Fair.**

RSPB Bempton Cliffs is the best site in mainland England for nesting seabirds, including gannets (*left*). Marsh harriers (*above left*) can be seen at nearby Hornsey Mere.

Breil nook: George Stoyle; harrier: Dieter Hopf/Imagebroker/FLPA; gannet: Steve Race



More than 200,000 seabirds, including razorbills (*above*), nest at Bempton Cliffs every year. Redstarts (*below*) can be seen at Spurn Point (*above right*) during the spring migration. Goldeneyes (*right*) are winter visitors to Tophill Low nature reserve near Driffield.

"So," I asked Andrew Mason, Yorkshire Wildlife Trust's heritage officer for Spurn Point, not quite having to shout to make myself heard over the 25-knot wind, "what's it like to work at the end of the world?"

"Bloody good fun," he replied with a grin.

End of the world might seem like an exaggeration, but Spurn Point is like nowhere I've ever been before. Heading south through East Yorkshire, the land is squished and squeezed by the North Sea on one side and the Humber River on the other until you reach this bizarre spit of land that juts some 5km into the river like the long, third digit of an aye-aye. From here there's nowhere to go, unless you fancy a dip in the estuary's turbid waters.

Add to that the frigid north-easterly that was whipping up white horses on the seaward side of the spit, and it really did feel like a point of no return.

THREE DEGREES

I'd been lured up to this forgotten corner of Britain by a novel marketing hook – the so-called Yorkshire Nature Triangle, which roughly encompasses Hull at one point, Flamborough Head at the notional apex and Spurn at the bottom right. It may not have the name recognition of its cousin, the Rhubarb Triangle, but it held the promise of creatures more charismatic than slugs and snails.

Yorkshire Wildlife Trust's business development manager Tom Marshall, who despite his job title is just an old-fashioned birder and naturalist, had said a jaunt around the three sides of the triangle would yield avocets, otters, puffins and other seabirds, marsh harriers, little terns and – at the southern extremity of Spurn – migrant songbirds in their thousands.

So far, despite the Arctic temperatures borne by that unseasonal north-easterly, Tom had largely kept his word, but Spurn Head proved his undoing. In spring and autumn, migrants drop in here to refuel on their way into or out of the British Isles, but in the late April of 2016 they were coming from the south and into an impossible headwind.

"Normally, you'd have redstarts, chiffchaffs and willow warblers on every bush," Tom said apologetically, as if it was all his fault because he'd forgotten to ask the Met Office for a nice, gentle southerly.

It didn't matter. Spurn is a remarkable landscape, and as Andrew Mason said, practically alive in its own right. Tides and winds take sand off the spit and then dump it back on again on a daily basis, and historical charts show how it has shifted its position over the centuries.

History also shows how it's not just today's migrants for whom Spurn Head has strategic importance. The port of Ravenspurgh – long since swallowed by the North Sea – is mentioned in some of Shakespeare's plays as the landing

A JAUNT AROUND THE YORKSHIRE NATURE TRIANGLE MAY YIELD AVOCETS, OTTERS, PUFFINS, MARSH HARRIERS AND – AT SPURN POINT – THOUSANDS OF MIGRANT SONGBIRDS.

Elsewhere in the UK, puffins mainly nest in burrows, but at Bempton Cliffs they use cracks and crevices in the chalk cliff-face.

Razorbills: Andrew Mason/FLPA; spurn point: Dave Pressland/FLPA; goldeneye: Graham Eaton/naturepl.com; redstart: Andy Sands/naturepl.com; puffin: Steve Race

point for Henry Bolingbroke, later to become Henry IV, who was on his way to topple Richard II.

And at the end of the spit, you'll find placements for the guns that guarded the narrow entrance to the estuary during World War II. Whoever controlled Spurn Head controlled access to the Humber and the ports upriver. Perhaps chiffchaffs are cleverer than we give them credit for.

AID FOR AVOCETS

I'd arrived at York two days earlier to be whisked off to North Cave Wetlands, a name that, to me, conjures up images of small, blind invertebrates crawling around on slimy, mould-encrusted rocks in semi-permanent darkness.

In fact, it's a collection of lakes created by sand and gravel quarrying which have been turned into a nature reserve (just outside the village of North Cave, hence its name), with the guiding hand of Yorkshire Wildlife Trust and the zeal of local volunteers. It's a breeding ground for ringed and little ringed plovers, lapwings, redshanks, common terns, and perhaps best of all, avocets.

With their fine monochrome plumage and delicate, upturned bills, avocets are one of Britain's most beautiful waders, and they have staged a stunning comeback since the end of the 19th century when they were extinct here.

In the past 25 years alone, numbers have increased by a whopping 470 per cent to more than 1,700 pairs, and that's down to sites like North Cave providing breeding habitat. Since they first arrived here in 2003, numbers have increased to more than 40 pairs in a good year.

"IN THE PAST 25 YEARS ALONE, AVOCET NUMBERS HAVE INCREASED BY A WHOPPING 470 PER CENT."

But they need a lot of TLC, said warden Tony Martin. "Avocet chicks have a huge mortality rate," he told me.

Above: an estimated 11,000 gannets nest at Bempton – it's the only place in England where our largest seabird breeds.

"Adults are fairly long-lived, but they are shockingly bad parents. If there's a predator around they'll fly into the air squawking, and the chick will just get picked up." As a result, Martin spends a lot of time devising new ways to give them a helping hand – electric fences that must be at least 1m high and atolls in the middle of the lakes with at least 20m of deep water between them and the shore. Both measures are necessary to keep marauding foxes out.

It merits repeating that this wetland would be lifeless fields had it not been for the aggregates business, though not everybody sees it that way. "You've got a great reserve here," a visitor remarked to Tony one day. But pointing at the quarrying operations, he added, "But what the bloody hell were you thinking when you allowed them to do *that*?"

OF AMUR FALCONS AND ALBATROSSES

From North Cave we headed north-east via Nunburnholme – for its red kites – to Tophill Low Nature Reserve, which started life as a treatment works for Yorkshire Water but has slowly become important for the birds and other wildlife, such as otters, it attracts. Tophill hit the 'birding' headlines when a red-footed falcon with a rather ragged appearance stayed for a month in the early autumn of 2008.

Now, red-footed falcons, while not common in Britain, do turn up here most years, so the vagrant was left alone by hard core twitchers. But then a photo appeared on birding websites showing it had been misidentified and it was in fact an Amur falcon – a first record for the UK and a species normally not found any closer to our shores than Ethiopia.

Gannets: Steve Race; little gull: Markus Varesvuo/naturepl.com; avocet: Ernie Janes/naturepl.com; butterfish: Robert Thompson/naturepl.com; rockpooling: Tom Marshall; falcon: George Brits/Getty

Little gulls (*top*) migrate over Hornsea Mere in the autumn, while avocets (*above left*) breed at North Cave Wetlands. Like Bex and James, head to South Landing on Flamborough Head (*above*) for a rockpool safari and look out for butterfish (*left*).

"When that became public, everyone turned up, but by then the bird had shuffled off," site manager Richard Hampshire told me, perhaps rather too gleefully.

The next morning we set off for Flamborough Head where we met Craig Thomas, chair of the local bird observatory. Overnight, wind speeds had picked up to something in excess of 25 knots, and hunkering down out of the worst of the weather – as best we could – we stared out at the broiling waters of the North Sea in the faint hope we might see something notable passing.

"The irony of sea-watching," Craig bellowed between gusts, "is that the worse the weather, the more likely something interesting will turn up." On that basis, there was a whole flock of great auks cruising past that morning!

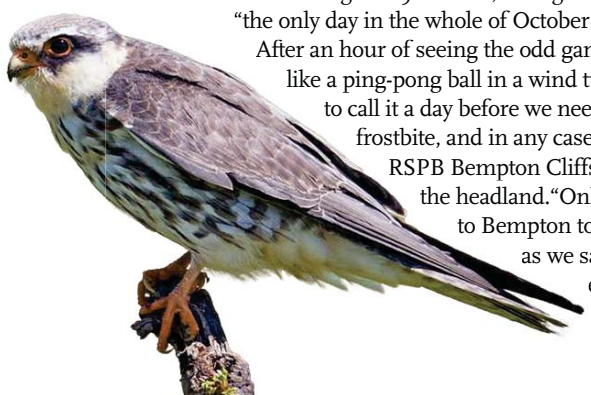
Flamborough Head, Craig told me, is a hotspot for migrating birds because it sticks out some 13km into the North Sea, thus catching passing migrants in need of rest and refuelling. It's great for watching seabirds such as gannets, puffins and guillemots, all of which nest at various sites on the headland, most notably the RSPB's Bempton Cliffs reserve on the northern side.

Over the years the observatory has also recorded some less likely birds, including a black-browed albatross on three separate occasions. The first record dates back to October 1974 and was assumed to be the same albatross that spent every summer at Hermaness, in Shetland, from the early 1970s until the mid-1990s, presumably on the misapprehension it was 60° south, not 60° north.

"Then an immature black-browed albatross flew past Flamborough on 5 October," Craig told me later in an email, "the only day in the whole of October that I wasn't here!"

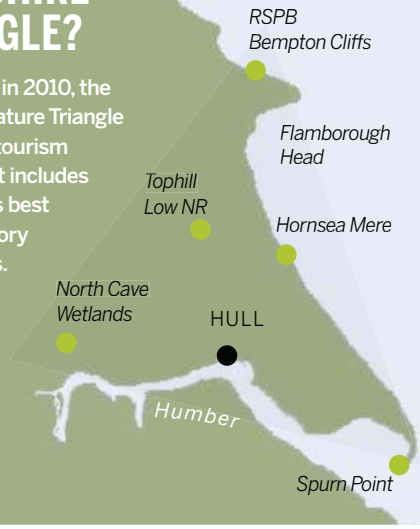
After an hour of seeing the odd gannet being swept along like a ping-pong ball in a wind tunnel, we decided to call it a day before we needed treatment for frostbite, and in any case we were expected at RSPB Bempton Cliffs, on the north side of the headland."Only a lunatic would go to Bempton today," Craig remarked as we said goodbye. He wasn't entirely joking.

The Amur falcon was recorded in the UK for the first time at Tophill Low Nature Reserve in 2008.



WHAT IS THE YORKSHIRE TRIANGLE?

Established in 2010, the Yorkshire Nature Triangle is a wildlife tourism hotspot that includes the county's best natural history experiences.



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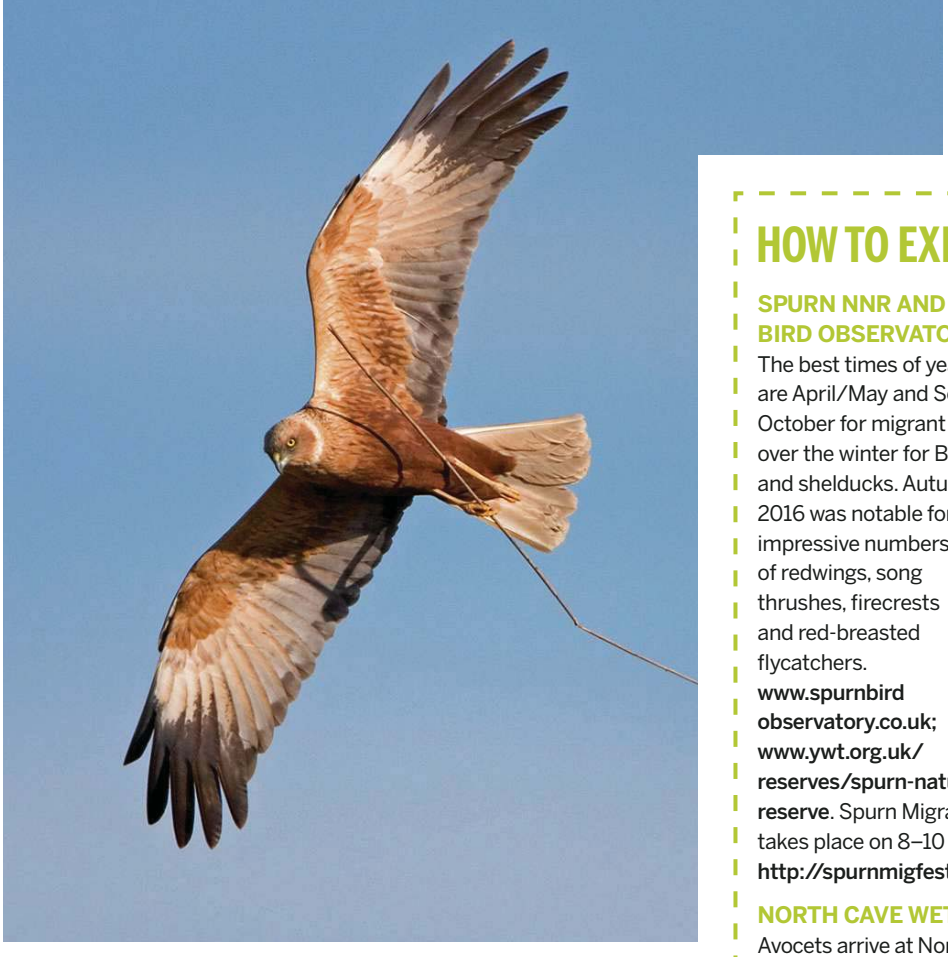

HOW TO EXPLORE THE YORKSHIRE TRIANGLE

SPURN NNR AND SPURN BIRD OBSERVATORY

The best times of year to go to Spurn are April/May and September/October for migrant songbirds, and over the winter for Brent geese and shelducks. Autumn 2016 was notable for impressive numbers of redwings, song thrushes, firecrests and red-breasted flycatchers. **www.spurnbirdobservatory.co.uk; www.ywt.org.uk/reserves/spurn-nature-reserve**. Spurn Migration Festival takes place on 8–10 September 2017. **http://spurnmigfest.com**

NORTH CAVE WETLANDS

Avocets arrive at North Cave to breed in early March, other waders such as ringed plovers and lapwings in March or early April and common terns in April or early May. Some 300 pairs of sand martins breed at the reserve. Teal, wigeon, gadwalls and shovelers arrive for the winter in late autumn. **www.northcavewetlands.com**

TOPHILL LOW NATURE RESERVE

More than 1,000 wigeon and 700 teal overwinter here, as well as whooper swans and goldeneyes. There is a resident one-eyed dog otter and a thriving water vole population. **http://tophilllow.blogspot.co.uk**

FLAMBOROUGH BIRD OBSERVATORY

A classic location for seawatching because, on any given day, thousands of seabirds fly past Flamborough Head. Notable day counts include 94,700 guillemots and 156,000 kittiwakes. In total, 340 species have been recorded here. **http://fbo.org.uk**

RSPB BEMPTON CLIFFS

Gannets arrive at Bempton between late January and early March and some adults and fledglings stay until late September. Puffins are the first of the auks to come back, usually by early-April, while guillemots and razorbills may be more towards the end of the month. All are mainly gone by the end of July. Short-eared owls come to Bempton for the winter, arriving late September. **www.rspb.org.uk**

WASSAND ESTATE, HORNSEA MERE

Renowned for its breeding marsh harriers in spring and summer. In the autumn, whimbrels, little gulls and sandpipers are all seen on passage. **http://wassand.co.uk**

Harrier: Paul Sawer/FLPA; tophill low: David Chapman/Alamy; otter: Michael Leach/Getty

Top: marsh harriers almost died out as a British breeding species but have recovered since the 1960s. Above: Tophill Low Nature Reserve formally opened in 1993.

As anticipated, Bempton was blowy, so we didn't linger. On any normal day, this is the best place in England to see nesting seabirds, and later in the season you can take a boat trip under the cliffs to watch the gannets plunge-diving for their dinner. But this wasn't any normal day.

Tom had, rather rashly, arranged a snorkel safari for me at South Landing on Flamborough Head, but everyone was probably relieved as it became evident that not even a lunatic would go snorkelling in the North Sea on a day like this.

Instead, with the help of Yorkshire Wildlife Trust's marine officer Bex Lynam, we carefully upturned rocks and stones to reveal the foreshore's hidden jewels, including a five-bearded rockling, a dragon-like butterfish, beaded anemones, tiny 'pie-crust' brown crabs the size of vol-au-vents and a 40cm-long paddleworm, an extraordinary beast I'd never even heard of, let alone seen before.

HORNSEA HARRIERS

From Flamborough, we headed south to Hornsea Mere, a large freshwater lake that is a popular birding site. But it's real speciality, revealed to us by George Bennett, the warden of the Wassand Estate, is its breeding marsh harriers.

George took us down to the hide on the lake at the west end and we were soon watching one of its resident males. "The female has a nest just there," said George pointing to a tree behind the male's perch. "And I think he's got another female over there," he added pointing north.

We were hoping to see the fabled marsh harrier food pass. A male catches an unwary coot or moorhen (or frankly any bird or small mammal – they have a catholic diet of more than 30 species) and, while in flight, drops the prey item into the talons of the female who may be upside down, like a pair of avian trapeze artists on invisible wires. But there was no sign of the male rousing himself for a hunt, let alone catching something and performing mid-air stunts.

We left Hornsea and continued down the triangle to its southern extremity of Spurn Point and those non-existent migrants, before I was dropped off at England's City of Culture 2017 to catch a train. I'd love to be able to say that I'd been to Hull and back, but in truth it was a total blast.

JAMES FAIR *is environment editor of* BBC Wildlife *and loves all things connected with Yorkshire (the Dales, rhubarb and cricket especially) except for one thing – tea.*

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LEND ME YOUR ears

Some people can't hear birdsong, while others simply don't. Why should this matter to all of us, asks **Graham Appleton?**

Illustrations by Michelle Thompson/Handsome Frank

When I was a teenager, I was fortunate to learn the songs and calls of many of our British birds, as I was asked to take on the Common Birds Census for Edgbaston Park in Birmingham. For some years our school natural history society had been running the British Trust for Ornithology (BTO) survey on the adjoining nature reserve, only a mile or so from the city centre. As a school club set up by, among others, renowned birder, conservationist and TV personality Bill Oddie, it relied on new generations of surveyors to keep the annual scheme running, and I was the latest in a long line.

When I was learning about that first census from my predecessor, I found some of the calls confusing. Interestingly, these calls turned out to be the ones that caused me trouble when I started to lose some of my hearing ability 45 years later.

It had been getting harder to pick out birds and identify individual calls, so I finally gave in and had a hearing test. I discovered that the 4 kHz part of my hearing range had been disappearing. I did not really feel that I needed hearing aids. Had I not been a bird watcher, I'd have just increased the volume of the TV. It had got to the stage, however, where I could no longer rely on my ears to do my survey work.

The Breeding Bird Survey was OK, because my wife Jenny and I always work together and her ears are a lot better than mine. However, observations from my daily walks around my local patch, when I fill in BTO BirdTrack lists, were probably starting to get a bit less reliable, especially if a bullfinch chose to call on my right, rather than my left.

Having Jenny alongside me highlighted that it was taking me longer to pick up a mix of calls – distant green woodpeckers were a problem, but I could still pick out the high-pitched calls of treecreepers. Hearing loss is different for all of us; my issues with the range around 4 kHz seem to take out a particular suite of species, which made sense when I chatted with Geoff Sample, who produces CDs of birdsong.

I wondered if I had been deluding myself about the last couple of years of BirdTrack lists. In a thought-provoking article in *British Birds* magazine a few years ago, the eminent ornithologist Richard Porter not only questioned his own records, but went on to express concern about the indices of bird abundance and the atlases of distributions to which many of us contribute.

"With an ageing BTO membership and therefore, presumably, an ageing voluntary survey workforce," says Richard, "how does this affect our survey results? Certainly I can no longer trust my records if listening for songs and calls is required, and I'd hate to think that some species seem to be becoming rarer simply because we can't hear them! It would be interesting to know whether the age 'signal' can be isolated from any long-term survey results."

The BTO's asssociate director for monitoring, Andy Musgrove, responded to Richard's concerns, explaining how biases might be detected, and provided some evidence that the age of observers is probably not changing much. Since that article, the BTO has amended the Breeding Bird Survey process, in that participants are asked to note how far away birds were when they were detected. Presumably, it will be possible to check whether in the past I picked up most of my blue tits when they were over 25m away, but that these days 75 per cent of my observations are within 25m. If the changes are too marked, I guess that my data will be discarded. ▶

HAVING JENNY ALONGSIDE ME HIGHLIGHTED THAT IT WAS TAKING ME LONGER TO PICK UP A MIX OF CALLS.

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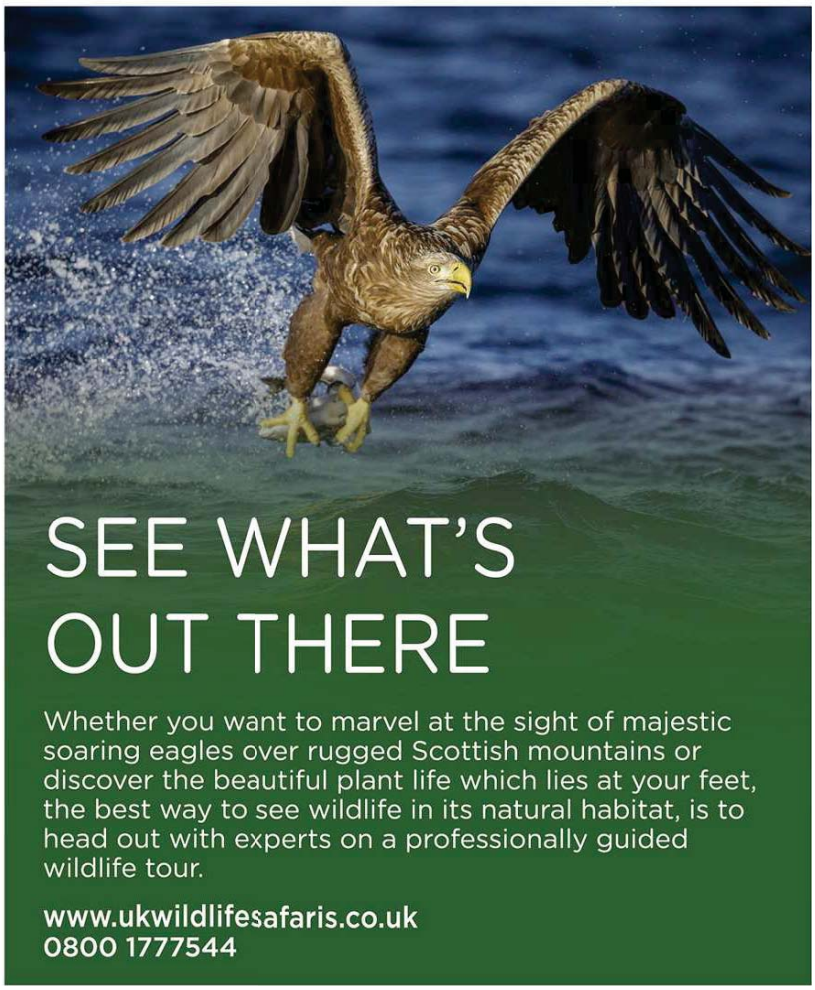

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There was a great deal of interest among surveyors in Porter's article, with many people contributing their own experiences. Typically, the first sounds that seem to become harder to detect are the high-pitched calls of species such as the goldcrest and treecreeper, and the reeling sound of grasshopper warbler. Often the high-pitched bird calls and leg rubbing 'singing sounds' made by grasshoppers will have been lost even earlier.

Looking at sonograms for some of the species that were giving me problems, I realised that the 4 kHz part of the sound range is really important. Take the green woodpecker, for instance. The main note of the yaffle is at 2 kHz but there are also strong harmonics at 4 and 6 kHz, and others that are higher still.

High frequencies do not carry as far as low frequencies, so my difficulty in clearly identifying their distant calls might well have had something to do with my gap at 4 kHz. The story is even clearer when it comes to issues I was having with one-note contact calls of great tit and chaffinch. I remember that it took a while to sort these out when I was first learning birdsong. It transpires that great tits like to make themselves heard with notes between 3.5 and 5 kHz and the chaffinch's call is almost pure 4 kHz. The yellowhammer's song and the buzzy bit of a skylark's call are based on the same frequencies.

HERE'S A PROJECT FOR SOMEONE: LET'S FIND OUT IF SOCIETY'S KNOWLEDGE OF BIRDSONG IS BEING LOST.

The process of regaining my hearing was teaching me a lot more about birdsong. My first outing with hearing aids was a revelation. There were robins singing in full colour, I could listen to the conversations in a flock of long-tailed tits (instead of just knowing that they were there) and I could quickly pick out the one-note calls of dunnocks, great tits, chaffinches and yellowhammers, as their 4 kHz sounds were amplified using hearing aids.

Not only did birdwatching become easier again, it also became more pleasurable. My heart was gladdened by the thrill of hearing a proper skylark trill, and high-pitched redwing calls. We use binoculars to make it easier to see birds, so why not wear hearing aids to make them more audible?

I had not realised how much my declining faculties were affecting the way I thought about myself until I read Richard Mabey's book *Nature Cure*. In his sensitive reflection on his recovery from depression, the loss of birdsong adds to his misery and feeling of isolation. He writes: "... I had to face up to the fact that I had lost most of the high-pitched warbler songs, just as I had lost the screaming of swifts. It wasn't a pleasant prospect, being cut off from the one thing that made me feel not cut off."

He describes a spring walk in which the songs and calls of birds were secondhand – observations made by his companion. "I feel humiliated, and hurt, as if I had had a personal gift unwrapped for me."

Richard Mabey's words reminded me of one slightly incredulous enquiry from my wife, while out walking: "Can't you hear that green woodpecker?" – and how that made me feel.

A great deal has been written about connecting people to nature. It is widely agreed that there are health benefits, but conservation organisations also understand that society only values things that it appreciates. So, for instance, if we want local councils to protect scrubby areas that provide homes for nightingales, then we need decision-makers and the people who influence them to be sufficiently connected with nature to appreciate that nightingales are wonderful singers with cultural significance in our literary history.

When I see teenagers, or 20- and 30-somethings in a park, taking advantage of the green spaces set aside for us by 19th- and 20th-century planners, most are listening to the human voice. Instead of appreciating, or just noticing blackbirds and song thrushes, they are talking to friends and listening to music.

Here's a project for someone: let's find out if society's knowledge of birdsong is being lost. Can 60-year-olds recognise ▶

more species than 30-year-olds? If they do, then my guess is that they probably learnt the songs as children and they have stuck in their memories.

We need a simple suite of test species – I suggest robin, blackbird, chiffchaff, wren, house sparrow and mallard – which can be found in almost every part of the UK. To avoid putting off people who feel they don't know any birdsongs, the songs could be wrapped up in a test of auditory recognition. As well as birds, a researcher could add in some well-known voices, a few distinctive human singers, a variety of musical instruments, some domesticated animals, etc. My guess is that more young people would be able to recognise Sir David Attenborough's voice than could distinguish a goat from a sheep or a chiffchaff from a robin.

It is not entirely a story of a lost generation of people appreciating birdsong, though. There are growing numbers of keen young birdwatchers who are getting actively involved in the BTO's surveys, encouraged by a strong presence on social media and through initiatives such as the youth nature network, A Focus on Nature (AFON).

Hopefully, these younger ears will replace worn-out ones and keep our monitoring surveys going. I was more concerned about the future of surveys 10 years ago than I am now. These days my worry is broader: where is the wider societal appreciation of birdsong, and can we bring it back?

Another couple of phrases from Mabey's book strike a chord with me: "We constantly refer back to the natural world to try to discover who we are. Nature is the most potent metaphor to describe and explain our behaviour and feelings."

Is it heresy to suggest that we are more likely to explain how we feel these days by referring to a television series or a film? Do we 'blossom like flowers' or do we 'go on a journey' like a celebrity on BBC One's *Strictly Come Dancing*?

When we learn birdsong, phrasing is really important. My hearing aids are not perfect and so I am training myself to focus more on the way songs are delivered. When you next listen to robin and dunnock songs, both of which use similar frequencies, think about the way that the dunnock keeps going while the robin pauses all the time, as if waiting to be applauded.

My attitude to hearing aids is similar to the reforming zeal of a former smoker. I'm a 'born again' bird listener. I want other birdwatchers to see if they can achieve a more rewarding birdwatching experience, simply by giving some of the low-spots in their bird call repertoire a bit of a boost. And I want everyone, birdwatcher or not, to learn to appreciate the birdlife around us.

Not everyone will have such a positive relationship with their hearing aids as I have. I'm fortunate that I have a fixable problem and I have dealt with it relatively early on. Had I had a lengthy period of not hearing species such as goldcrest and treecreeper, it may not have been so easy to retrain my brain to translate the slightly different qualities of the songs, with and without aids.

I have been less fazed by the downsides of aids – the exaggerated sound of rustling papers and the echoing sound of my own voice – because my work as a communicator for the BTO has given me similar experiences when working on the radio. There are still some annoyances – I sometimes take out my hearing aids when unloading the dishwasher, for instance, in the same way that I take off my glasses before opening the oven door.

I'm aware that my hearing is likely to get worse and I shall probably be unavailable when the BTO needs to organise the next Bird Atlas project, which is due to start in November 2027. In the next 10 years, I hope that a new generation of birdwatchers can train their young ears to discriminate between the 'hweet' and 'hoo-eet' calls of chiffchaff and willow warbler and to appreciate the different songs of blackcap and garden warbler.

After all, there's work to be done.

HOPEFULLY THESE YOUNGER EARS WILL REPLACE WORN-OUT ONES AND KEEP OUR MONITORING SURVEYS GOING.

GRAHAM APPLETON is the former director of communications for the BTO. Read his blog at **https://wadertales.wordpress.com**

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SPECIAL DELIVERY

Despite winter chills, Britain's baby **RED SQUIRRELS** arrive in February and March, reveals Amy-Jane Beer.

Red squirrels – like their grey relatives – don't hibernate, though they're less active in harsh weather. These are tough animals – you can see them foraging even when snow is falling thick and fast. They also give birth well before winter loosens its grip. The first kittens of the year usually arrive in February or March, safe inside their mother's drey.

From below, you might mistake a red squirrel drey for the nest of a magpie or crow. But instead of being an open platform, the drey is broadly spherical with a domed, rain-shedding roof. The external structure is a skilfully constructed scaffold of sticks, woven with thinner twigs, packed with leaves to keep out wind and rain.

Breeding dreys are about 30cm across and typically close to the trunk, to provide stability in strong winds. They are luxuriously padded inside with soft material such as moss, lichen, animal hair and grass, and may be refurbished and reused several years in a row. Repairs tend to be made with fine twigs woven in to the existing structure.

Litter sizes vary from two to six, with three or four the norm. The kittens are naked at first and heavily reliant on shared body heat and the drey's thick insulation. In the early days the mother spends most of her time inside, emerging only briefly to feed or drive away intruders. Males play no part in rearing young.

After three weeks the young develop fur, and by seven weeks they are ready to begin exploring the outside world. Often the mother will move out after her litter is weaned at about 10 weeks, leaving the young to decide for themselves when to leave home.

Dreys are also used for shelter. Red squirrels are not territorial – adults occupy home ranges that overlap with those of their neighbours. In winter they frequently share resting dreys – even males that spend the daylight hours in fierce competition for the same female have been known to cosy up come nightfall as temperatures plummet.

● *Amy-Jane Beer is a naturalist and frequent contributor to* BBC Wildlife Magazine.

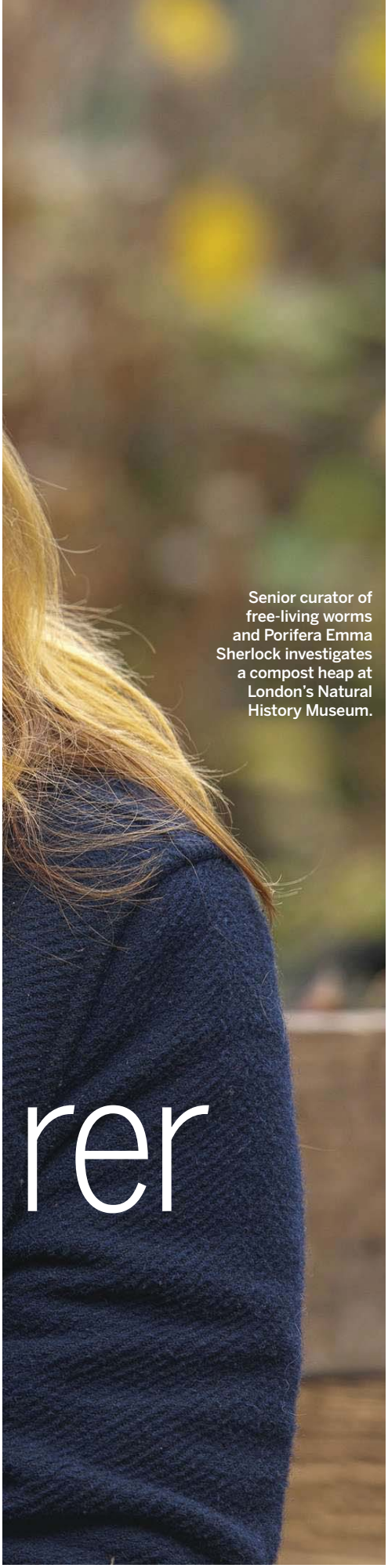
Andy Rouse/naturepl.com

An adult red squirrel braves a Scottish blizzard in March. Females stay snug in breeding dreys with their new kittens, only briefly venturing outside.

Life depends on earthworms, yet they're taken for granted. **Helen Pilcher** meets the UK expert on a mission to make us love these fascinating creatures.

The WORM whispe

Portraits by **Charlie Best**



Senior curator of free-living worms and Porifera Emma Sherlock investigates a compost heap at London's Natural History Museum.

rer

Top: temmuzcan/Getty; bottom: iStop Images/Alamy

On a clear, crisp afternoon the sun casts dappled shadows on the leafy wildlife garden outside London's Natural History Museum where Emma Sherlock is heading for the compost heap. She lifts the lid and peers underneath, then beams. "There they are," she says. Sure enough, glistening against a background of dark, decaying plant matter are the writhing bodies of not one, but several, earthworms. She teases one from its warm, peaty bed and lays it neatly across the palm of her hand.

A couple of inches long, the earthworm's stripy, segmented body has the hue of a well-aged Merlot. When she nudges it gently, it squirms then, unexpectedly, oozes a small blob of bright yellow goo from its tail end. "Do you see that? Have a sniff," she says, proffering me her palm. I inhale in the wormy aroma. It's acrid and unpleasant, and we wrinkle our noses. "They do that to deter predators," says Emma. "Aren't they incredible?"

AMAZING TALENTS

Earthworms, it seems, are full of surprises. Far from the boring, brown wrigglers of common misperception, they are a diverse and dazzling bunch, full of unexpected quirks and peculiarities. Some Asian earthworms, for example, avoid being eaten by launching themselves into the air, while other species deliberately detach their tail, which then wiggles enticingly whilst the front half sneaks off and quietly regrows the missing appendage.

They come in all sorts of colours – red, blue and green – and all sorts of patterns. Some are striped, and there is even one species from the Philippines that looks as if it has been pelted with miniature fried eggs. Some glisten with an iridescent sheen, others luminesce. The unsung

WE WALK OVER THEM YET FEW OF US HAVE PAUSED TO CONSIDER THEIR BEAUTY OR THEIR VALUE.

heroes of the underground, earthworms provide round the clock ecosystem services that mankind would struggle to live without. We literally walk all over them, yet few of us have ever paused to consider their beauty or their value, and the truth is, there is just so much about them that we still don't know. Emma Sherlock, champion of the humble earthworm, hopes to change all that.

We carefully place the annoyed invertebrate back in its rotting residence and replace the cover. "Most people think there's just one type of earthworm," says Sherlock, "but there's at least 27 different species in the UK, and 5,000 or more in the world." *Eisenia fetida*, the compost worm, is just one of them. The big reddish-brown one – *Lumbricus terrestris* – which is loved by gardeners and robins alike, is another. It can grow up to 40cm long, she explains.

Lumbricus terrestris spends most of its life hidden in deep earthy burrows, but when the sun goes down it pokes its head above ground to grab leaves and other fallen plant matter. It anchors itself into the ground with its flattened spade-like tail then silently drags its bounty down into the deep where it is consumed. "It's an amazing sight," says the curator. "They're so muscular and powerful, and yet so gentle all at the same time."

Sherlock, who has a lifelong love of natural history, became bitten by the earthworm bug when she was invited to study ▶

Earthworms play an important role in decomposing dead organic matter.

Sherlock examines a tiger worm found in a pile of leaves.

THE FRUIT OF A CARPATHIAN FORAY DANGLES FROM HER FINGERS LIKE A STRAND OF FAT, RUBBERY SPAGHETTI.

them in Romania with earthworm doyenne Victor Pop. A senior scientist at the Institute of Biological Research, Cluj-Napoca, Pop makes for an enigmatic mentor. He wears bottle-top glasses and a smile that is as broad as it is infectious. His workroom is full of pickled worms in tall test-tubes, and like his father before him Pop has dedicated his life to cataloguing the earthworms of his homeland.

Sherlock spent weeks in Pop's company, studying his collection, learning field skills and hunting for giant earthworms on the leaf-littered slopes of the Carpathian Mountains. It's there that she first met *Octodrilus permagnus*, a species of earthworm first discovered by Pop over 25 years ago, that grows to over 1.5m long. "They're really impressive," she says. It's the biggest earthworm in Europe, but not the world. That title goes to the whopping giant Gippsland earthworm of Australia, which can sometimes exceed 2m in length.

CABINET OF CURIOSITIES

Inspired by the diversity she witnessed and by Pop's generous spirit, Sherlock now manages the Natural History Museum's extensive earthworm collection in her guise as senior curator of free-living worms and *Porifera*. The museum has thousands of specimens from all over the world. Most are hidden away inside tall locked cupboards, while in her laboratory every conceivable inch of worktop space is covered... in worms. Bleached by the preservatives that protect their bodies, they lie curled up inside jam jar after jam jar.

She picks one up and carefully teases out its contents. The fruit of a Carpathian foray, the ghostly earthworm dangles from her fingers like a strand of fat, rubbery spaghetti. This one is about 30cm long, so it's a relative youngster. She shows me its muscular hooked mouthpart. We can tell it's an adult, she explains, because of its thick belt, the clitellum.

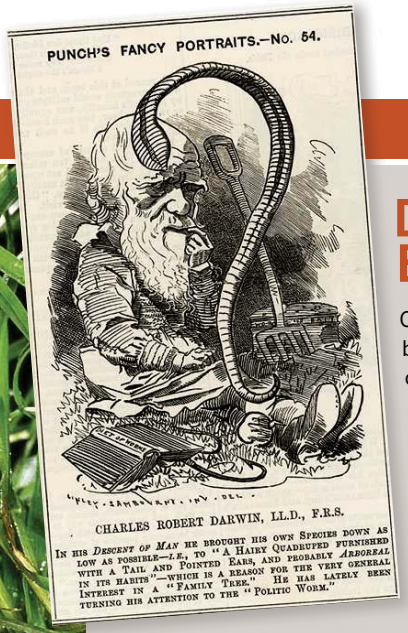
Famously hermaphrodite, amorous worms pair up head-to-tail before exchanging sperm. The suitor's seed is then stored in special sacs called spermatecea, but when

1) SETAE
All segments, except the first, have four pairs of retractable bristles that help the earthworm to grip the soil as it moves.

2) SOIL FEEDERS
'Endogeic' worms are horizontal burrowers and soil eaters that are usually found in the top 20cm of soil. They are grey, pinkish or green.

3) CLITELLUM
This belt-like structure is part of the reproductive system. The earthworm deposits eggs and sperm here.

Cross section: Auscape/Getty; Darwin: Mary Evans Picture Library/Alamy



DARWIN'S EARTHWORMS

Charles Darwin may be best known for his theory of evolution by natural selection, but he was also a massive earthworm enthusiast. He performed experiments, spanning decades, to work out the rate at which worms recycle the soil, and observed their knack for carefully interring leaves, pointed end first. He tested their food preferences by feeding them cherries and carrots, and their hearing by shouting at them and playing them the bassoon. He chronicled his findings in the last book he ever wrote, which he called *The Formation of Vegetable Mould through the Action of Worms, with Observations of their Habits*. Published in 1881, the annelid opus was an instant hit, even outselling Darwin's best-known book, *On the Origin of Species*, during his lifetime.

4) 'TAIL'
This 'tail' flattens into a spade-like shape to help the the earthworm anchor in its burrow. These species are known as 'anecic'.

5) HEAD END
Pointed for burrowing. The first segment contains the mouth and a fleshy lobe that helps it 'grip' leaves and plant matter.

6) SEGMENTS
Earthworms are annelids so have segmented bodies - the number of segments varies between species.

the time is right it is released along with the worm's own eggs into a wad of mucous produced by the clitellum. Fertilisation occurs and the sticky structure is then shed into the soil where it dries to become the egg capsule from which new life will hatch.

It's Sherlock's goal to collect, catalogue and study as many of the world's earthworms as she can, but she's far from the first to be captivated by the unassuming annelids' charms. People have been fascinated by earthworms for thousands of years. When he wasn't pontificating on the nature of existence, Greek philosopher Aristotle described them as the "intestines of the earth". Charles Darwin, who studied them in detail, dubbed them "nature's ploughs" on account of their ability to mix soil and organic matter.

GARDENER'S FRIENDS

The average British garden contains seven or eight different earthworm species. Some live on the surface of soil or compost where they feast on leaf litter and detritus, while others live in and feed on the soil. At any one time, there could be more than a thousand of the hard-working tunnellers directly under your feet. Different types of earthworm make both horizontal and deep vertical burrows, aerating the soil and providing drainage and protection from flooding. Their tunnels break up the soil so that plants can stretch their roots, and their casts return nutrients to the earth in a form that plants can use. They are ecosystem engineers, sculpting and fertilising our soils, and they make protein-rich pickings for the animals that feed on them, including birds, mammals, amphibians and even some other worm species.

Earthworms, it seems, are nature's altruists. All they do is give, give, give yet we smear their homes in ▶

Sherlock's laboratory is full of jars of fascinating worm specimens.

pesticides, plough them into pieces and rarely give the segmented wonders a second thought. "They must be the most underappreciated animal on the planet," she says. But we ignore the earthworm at our peril. We live in the midst of a global biodiversity crisis, where flora and fauna are disappearing faster than we can identify them. If earthworms become endangered, then so too do the ecosystem services they provide.

EXCITING DISCOVERY

In 2015, there was a flurry of excitement when Sherlock discovered an earthworm that had been presumed extinct in the UK, hiding inside a rotting log in the Natural History Museum's very own wildlife garden. One of the UK's smallest earthworms, *Dendrobaena pygmaea* hadn't been seen for 32 years. "It was such a surprise to find it," says the annelid enthusiast, "and on our own doorstep, too." Since then the same species has been found in four different locations, but while the discoveries are undoubtedly good news for earthworm biodiversity, they highlight a profound predicament.

"The problem," she says "is that we don't really know what earthworms we have." Recently, she tried to pool

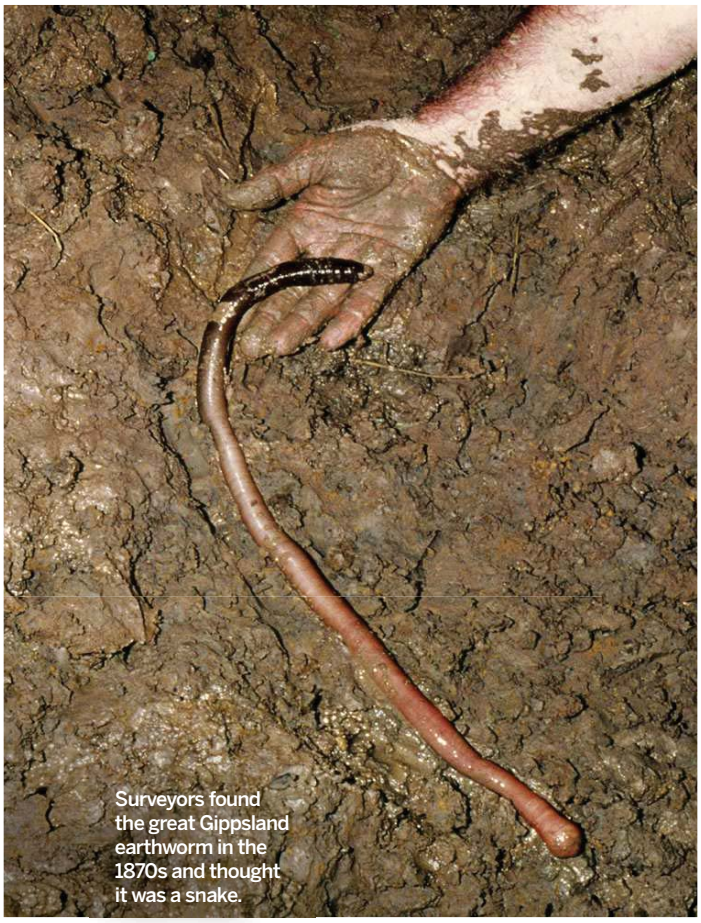
THE FIRST STEP IS TO BUILD A PICTURE OF THE EARTHWORMS THAT WE HAVE AND MONITOR POPULATIONS AND SPECIES.

ALIEN INVASION?

The New Zealand flatworm is a slimy, invasive species that landed on British soils over 50 years ago and has been eating the native earthworms ever since. Studies in Scotland suggest that where the flatworm flourishes, earthworm numbers decline, sending mole populations into a nosedive. With fewer earthworm burrows and so less drainage, fields can be transformed from lush grass pastures to areas that flood on a regular basis. Now widespread across the UK, the alien species is a cause for concern and scientists are monitoring it carefully to predict its possible future impact.

● *Learn more at www.opalexplorenature.org/nzflatworm*

The New Zealand flatworm is very distinctive with a purplish-brown upper surface.



Surveyors found the great Gippsland earthworm in the 1870s and thought it was a snake.

all the scientific data she could muster and plot the distribution of the various UK earthworm species on a map of the country, only to find that the dots were disappointingly sparse. But it wasn't necessarily that the earthworms were scarce, rather, simply, that the data didn't exist. "We know very little about their distribution and exact habitat preferences because there are just not enough people recording earthworms."

GETTING YOUR HANDS DIRTY

This pervasive problem extends far beyond the UK. Vast swathes of the world are completely unsurveyed. Nicaragua, for example, has no species list for earthworms. So when Sherlock went there on a field trip in 2009 and found a bluey-purple worm hiding inside a bromeliad plant, it was inevitably a new species. She named it *Eutrigaster (Graffia) azul* because 'azul' is the Spanish word for blue.

Concerned by the dearth of earthworm data and the lack of willing recorders, Sherlock is making a stand for the earthworm. She is a proud co-founder of the Earthworm Society of Britain, a friendly organisation set up in 2009 that promotes wormy citizen science and entices anyone who doesn't mind getting their hands dirty to dig in the garden and then report what they find. They offer

Sherlock hopes to encourage more people to take an interest in earthworms and record vital data.

training courses, identification skills and a chance for anyone to add dots to Sherlock's UK earthworm map.

The first step is to build up a picture of the earthworms that we have today, then to monitor populations and species to see how they change over time. Only then will scientists be able to know how healthy or otherwise our earthworm populations are. By spreading love and respect for the earthworms of our native soils, the Earthworm Society of Britain aims to help conserve earthworms and their habitats, and to educate and inspire people so these fantastic creatures can be enjoyed for many, many years to come. "There is so little data out there," Sherlock says, "that any earthworm enthusiast who wants to start recording has the potential to make a real difference."

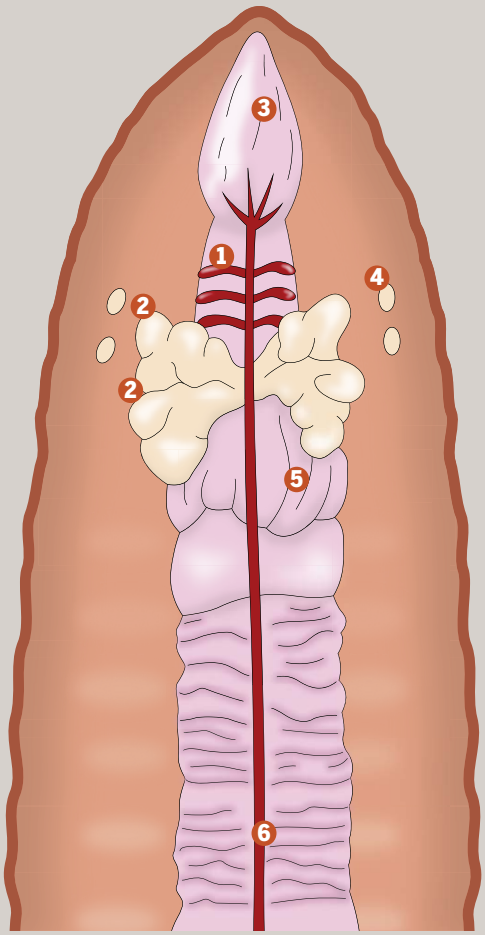
So perhaps we should be getting a wriggle on. I think it's time we gave the earthworm; Earth's most unloved altruist, the recognition it so richly deserves.

HELEN PILCHER *is a science writer and comedian. Her first book is* Bring Back the King: The New Science of De-extinction *(Bloomsbury Sigma, £14.99).*

FIND OUT MORE

- Learn more from the Earthworm Society of Britain: **www.earthwormsoc.org.uk**

EARTHWORMS



WHAT GOES ON INSIDE AN EARTHWORM'S HEAD?

1) PSEUDOHEARTS
Earthworms have multiple pairs of pseudohearts, so-called because they don't pump blood, rather they squeeze one of the main blood vessels to help move blood around the body.

2) SEMINAL VESICLES
Worms are hermaphrodite, meaning they have both male and female sex organs. The worm's own sperm are stored here.

3) MUSCULAR AREA
Contains the tiny pin head-sized brain, oesophagus and pharynx.

4) SPERMATECEA
Sperm from other worms are stored in these tiny sacs.

5) CROP AND GIZZARD
These areas are used to process food. Food passes into the crop and is then ground down in the gizzard.

6) BLOOD VESSEL
Unlike most invertebrates, earthworms have the oxygen-carrying molecule haemoglobin in their blood.

New Zealand flatworms: Steve Hopkin/ardea.com; Gippsland earthworm: Ralph & Daphne Keller/NHPA/Photoshot; emma digging: John Hunt/Earthwatch; Earthworm illustration by Acute Graphics based on sketch by Louise Berridge

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BBC Wildlife

Close encounter

When two Shetland naturalists met some inquisitive whales the result was Britain's first underwater humpback images – and a big surprise for scientists. **Amy-Jane Beer** reports.

Photos by
Richard Shucksmith
and **Brydon Thomason**

The year 2016 was remarkable for British great whale records, including a blue whale photographed just outside UK waters, and the sad stranding of several sperm whales on North Sea coasts. But perhaps the most exciting place to be was Shetland, where orcas spent much of the summer a stone's throw offshore and social media ensured everyone knew exactly where to look. Then, in November, humpback whales were reported in the north-east of the archipelago.

Local naturalists Richard Shucksmith and Brydon Thomason knew they had to react quickly. "Humpback sightings in Shetland have increased recently, but usually they're just passing through, so you have to take your chance to see them," says Brydon. This time, however, the whales stuck around, with up to five using the area. The unprecedented frequency of sightings presented the exciting possibility of decent photos and something never before managed in British waters – underwater footage.

"Shetland's great for underwater photography," says Richard. "We routinely get visibility of 10–15m, compared to 5–6m in somewhere like the North Sea. The problem is the weather – calm days can be few and far between." Unfortunately for Richard, a perfect weather window in early December clashed with a trip south, and he was boarding a plane as Brydon set out with another friend, Peter Hunter, in Peter's small boat. "It was awful," says Richard. "I was on the runway getting text messages from Brydon saying '*This is amazing, where are you*?'"

Brydon's excitement was justified. He and Peter had located two large adult humpbacks and watched from a cautious distance as the whales repeatedly circuited a small area. Peter slowly manoeuvred his boat into an intercepting position, then turned off the engine and waited. "It was important not to disturb the whales," Brydon says. "Instead we gave them the chance to come to us if they wanted."

As it turned out, the whales were exceptionally inquisitive. They approached the boat repeatedly, sometimes as close as 10m, spyhopping, tail-lobbing, slapping the water with their huge pectoral fins and even breaching. Brydon took a series of spectacular photos, including clear shots of the uniquely patterned tail flukes, which he sent to the Sea Watch Foundation and North Norwegian Humpback Whale Catalogue and posted online to see if anyone had a match.

By the time Richard returned to Shetland, the weather had closed in. "But the next Monday, I walked out to one of the headlands. About a kilometre out, I spotted two huge blows. Over the next 10 minutes two humpbacks swam ▶

A British first: this unprecedented photo shows the heartstopping moment a humpback whale calmly checked out Shetland naturalist Richard Shucksmith.

directly towards us until they were no more than 6–7m out." This proved a good omen, and when the next day dawned bright and calm, Brydon and Richard set out together with Peter.

"We had to be quick," Richard explains. "It was only a week off midwinter, and we couldn't expect more than three hours' decent light." With luck on their side they found two circuiting whales easily and manoeuvred into position. As the whales came into view, Richard slipped into the water. "I felt a real nervous excitement. The more time you spend around wildlife, the more you realise that every animal is different. I didn't know how they'd react."

A TASTE OF THINGS TO COME?

Experience with other cetaceans has taught Richard to move as little as possible. "I just floated quietly, looking though the camera. Then I heard a blow very close and popped my head up – I couldn't believe how near they were. I looked down again and in my peripheral vision these huge dark shapes loomed up. They cruised past, then turned back to swim under me. It was striking how 'bendy' they were – you wouldn't think they could twist and turn so easily. They really checked me out, and all the time I was thinking 'This is in *Shetland*!'"

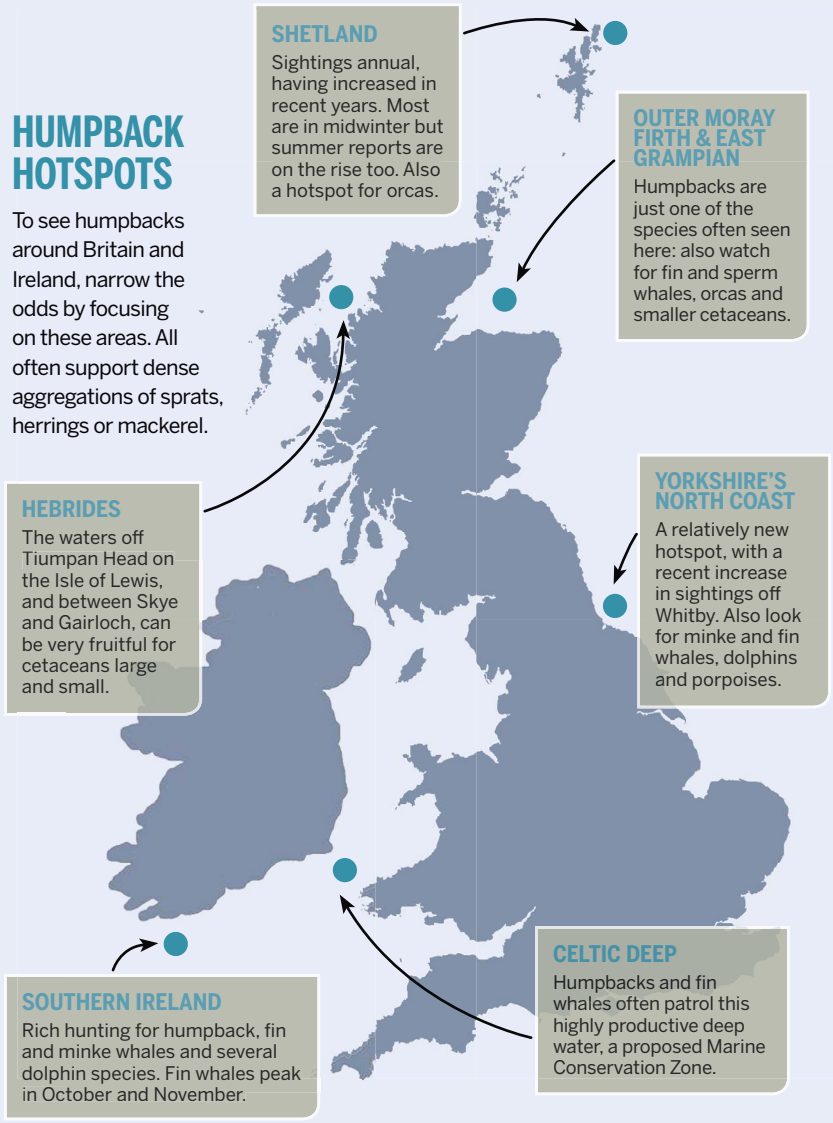
Meanwhile, Brydon was filming from the boat. "I could tell these weren't the same whales, not least by their smaller size, but their behaviour was also very different, as they were far less inquisitive." Does that reflect different personalities or moods, I wonder? "Possibly. They were smaller animals, probably sub-adult. The behavioural difference was perhaps just what they were doing at the time."

It's exciting to imagine that Richard and Brydon's experience may well be a taste of things to come. The humpbacks were still being seen around Shetland in mid-January, and with other sightings in the Hebrides, off the Moray Firth, and as far south as the Yorkshire coast last summer, it seems there has never been a better time to see great whales in and around the British Isles.

Peter Evans has spent a career monitoring cetaceans around Britain and Ireland as founder and director of the

HUMPBACK HOTSPOTS

To see humpbacks around Britain and Ireland, narrow the odds by focusing on these areas. All often support dense aggregations of sprats, herrings or mackerel.



SHETLAND
Sightings annual, having increased in recent years. Most are in midwinter but summer reports are on the rise too. Also a hotspot for orcas.

OUTER MORAY FIRTH & EAST GRAMPIAN
Humpbacks are just one of the species often seen here: also watch for fin and sperm whales, orcas and smaller cetaceans.

HEBRIDES
The waters off Tiumpan Head on the Isle of Lewis, and between Skye and Gairloch, can be very fruitful for cetaceans large and small.

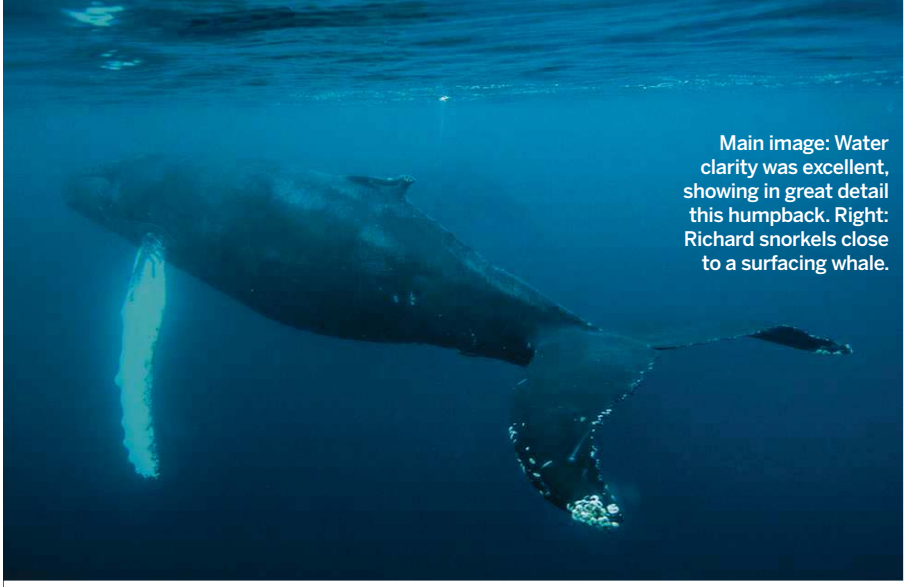
YORKSHIRE'S NORTH COAST
A relatively new hotspot, with a recent increase in sightings off Whitby. Also look for minke and fin whales, dolphins and porpoises.

CELTIC DEEP
Humpbacks and fin whales often patrol this highly productive deep water, a proposed Marine Conservation Zone.

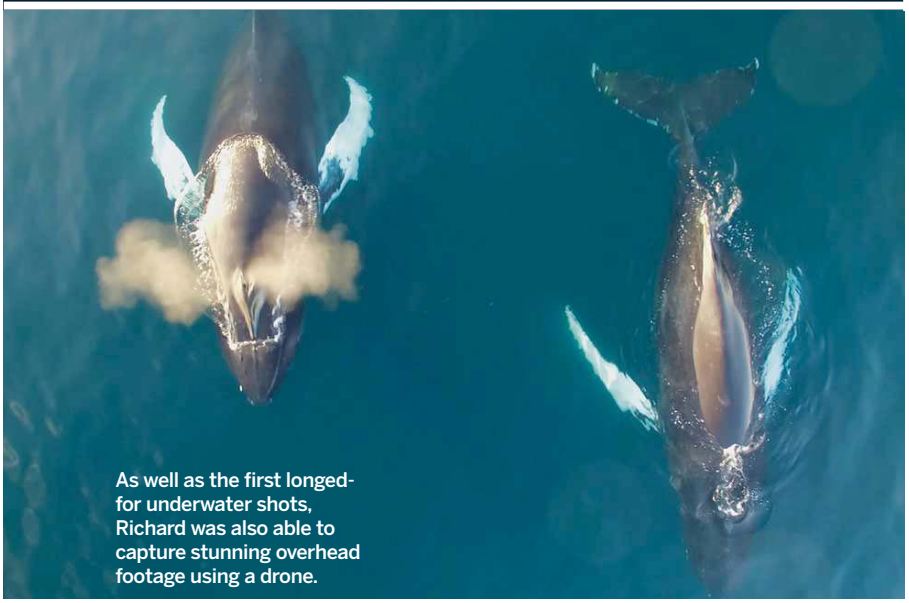
SOUTHERN IRELAND
Rich hunting for humpback, fin and minke whales and several dolphin species. Fin whales peak in October and November.

THEY APPROACHED REPEATEDLY – SPYHOPPING, TAIL-LOBBING, SLAPPING THE WATER AND EVEN BREACHING.

Brydon's photo shows a spectacular 'belly-up' breach. The sound can carry hundreds of metres underwater.



Main image: Water clarity was excellent, showing in great detail this humpback. Right: Richard snorkels close to a surfacing whale.



As well as the first longed-for underwater shots, Richard was also able to capture stunning overhead footage using a drone.

Sea Watch Foundation, celebrating its 25th anniversary in 2017. "A variety of evidence indicates that humpback populations have been increasing in the north-west Atlantic," he says. "Most of them breed in the West Indies, and there's a small breeding population in the Cape Verde Islands, off north-western Africa. We're also seeing some recovery in potential prey species. In the UK, you tend to see humpbacks where there's a LOT of food around."

Humpbacks are well known to eat herrings, sprats and sandeels, and it seems likely they also take mackerel. "We often see humpbacks in UK and Irish waters in association with both herring and mackerel shoals," says Evans, "but because mackerel are themselves predators of smaller fish, we can't yet say whether the whales are hunting them or just targeting the same small prey."

In the first of Brydon's encounters the humpbacks were associated with massive mackerel shoals, but firm proof of mackerel hunting has eluded him and Richard so far.

But there was another stunning revelation in store. Brydon sent good identifiable tail-fluke images of two of the five individuals to relevant organisations for possible matches. Neither the North Norwegian Humpback Whale Catalogue or The Irish Whale and Dolphin Group (IWDG), whose previous records links Irish humpbacks to Norway, Iceland, the Netherlands and even Gibraltar, had a match. But Padraig Whooley of IWDG put Brydon in touch with the world's largest humpback ID database, the North Atlantic Humpback Whale Catalogue in Maine, USA.

Below: these photos taken off Guadeloupe by Cedric Millon on 7 March 2016 matched tail-fluke patterns on one of the Shetland humpbacks. In both places, it was accompanied by another adult: are they the same two, travelling together?

Cedric Millon, Guadeloupe Evasion Découverte

STUNNING REVELATION

The reply was thrilling. The first-ever match for a UK or Irish humpback to a breeding area. Only it wasn't Cape Verde, the main humpback breeding ground this side of the Atlantic. Amazingly, the Shetland whale in question was last recorded in March 2016 by Cedric Millon, a tour guide from Guadeloupe Evasion Découverte, in the Caribbean – an ocean away. "I just couldn't believe it," exclaims Brydon. "To get such a significant match from the first tail-fluke ID attempt from Shetland was remarkable – and lucky!"

Peter Evans had been waiting for just such a result. "We've been looking for some time at possible links with the expanding western Atlantic population. Western humpbacks may travel here via Iceland and Norway, which would explain why we're seeing them more around the north of Britain. What's also interesting is that we're seeing them here in *winter*, when most west Atlantic breeding adults are on their breeding grounds."

Perhaps, Evans speculates, the Shetland animals aren't quite fully mature. "Or maybe they're taking a year off – humpbacks don't breed every year. Or maybe," he adds very tentatively, "maybe with global warming, some are remaining overwinter and even breeding further north than before. We've never seen young calves here, so can't yet say that's happening, but it's something to look for."

As with all exciting insights, this one raises more questions than it answers. There's much still to learn – and with technological advances and more contributions from citizen scientists, the data is coming in fast. But most encouraging of all, says Brydon, is the fantastic international collaboration he and Richard saw. "It was so inspiring."

AMY-JANE BEER *is a naturalist and frequent* BBC Wildlife *contributor. She writes about red squirrels on p36.*

FIND OUT MORE

- Watch spectacular footage of the Shetland humpbacks at **https://vimeo.com/196105154**
- Brydon and Richard's websites: **www.shetlandnature.net** and **www.shetlandphototours.co.uk**

MEET THE WINNERS OF OUR BLOGGER AWARDS

BBC Wildlife LOCAL PATCH BLOGGER AWARDS 2016

THROUGHOUT 2016 OUR LOCAL PATCH REPORTERS HAVE BEEN WRITING ABOUT WILDLIFE FOUND IN THEIR NEIGHBOURHOODS.

Talented bloggers in the UK and around the world have been busy exploring wildlife habitats on their doorsteps and further afield over the past year. They have been sharing their exciting nature experiences and discoveries with a passionate online community via the *BBC Wildlife* Local Patch Reporters Forum.

Our expert panel of judges had the wonderful task of reading through blog posts that are rich in variety, admiring wildlife photography and watching footage of amazing animal behaviour. To see the full list of winning entries visit www.discoverwildlife.com/news/blogger-awards-2016

YOU CAN BE A LOCAL PATCH BLOGGER TOO!

Post your blog updates on our forum:
www.discoverwildlife.com/forum

Ciara found a tailless whip scorpion during a jungle night walk.

WINNER

CIARA STAFFORD

Manchester, UK/Amazon, South America

Stripy Tapir

https://stripytapir.wordpress.com

"CIARA HAS GENUINE EXPERTISE TO IMPART TO READERS AND WRITES A NEAT BLOG WHICH IS INFORMATIVE, AND GENTLY HUMOROUS."

JAMES FAIR

I started Stripy Tapir as a field journal of sorts, to share photographs and stories of the wildlife I see at home and on my travels. Though distinctly international in scope, I hope my blog bears testament to the fact that beguiling species are never too far from home. I split my time between Manchester and Norwich in the UK, and my field site in the Amazon rainforest. I study primate conservation, and my research focuses on exploring the relationship between primates and the indigenous communities they share their habitat with. I'm interested in whether people think primates have ecological or cultural value, which species benefit from the way populations manage their forests, and which are most vulnerable to hunting.

Highlight of the year

The night walks in the Amazon jungle come out on top as my highlight of the year, as they included some of the area's most bizarre invertebrates, and glimpses of behaviours that are really rare. I saw a bird caught in a spider's web, and a tailless whip scorpion. I even managed to find my first ever gladiator tree frog. For years I had only heard the disembodied croaks of this species coming the canopy. Incredible animals, great company, and an adventure. What more could a Local Patch Reporter want?

THE JUDGES

LIANNE DE MELLO is public relations and communications officer for the Hampshire and Isle of Wight Wildlife Trust, and leads on media campaigns.

MELISSA HARRISON is a novelist and nature writer. She is also the editor of four anthologies of writing about the seasons.

DAVID LINDO is a naturalist, writer and photographer from London who is passionate about engaging people with urban wildlife, especially birds.

JAMES FAIR is environment editor of *BBC Wildlife Magazine*. To read his latest feature on Yorkshire's nature triangle see p20.

RUNNER-UP

WILL HARPER-PENROSE

London, UK

Wild South London

https://wildsouthlondon.wordpress.com

My blog began as photographic evidence of my local wildlife, but through a new-found awareness of what I'm looking at, it has become a place for pondering animal behaviours.

> "WILL'S OPEN WRITING STYLE MAKES THE ORDINARY SEEM EXTRAORDINARY."
>
> LIANNE DE MELLO

Highlight of the year:
I was visiting South Norwood Country Park in May, an old sewage works that now hosts a range of habitats and wildlife. On this visit, it was rampant with butterflies including green-veined whites. I noticed the raucous call of two jays, who were mobbing something a few metres away from me. I raced to the scene to find a bemused-looking tawny chick peering at me with two big black eyes.

This tawny owl chick stared back at Will from a tree.

Orca off Vancouver Island, Canada.

HIGHLY COMMENDED

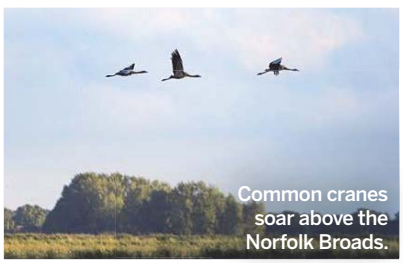
CONNEL BRADWELL

Ontario, Canada

Daily Nature

www.dailynature.net

I am passionate about getting people to connect with the natural world around them and write about my own wildlife experiences. The focus of my blog is to show that no matter where you are in the world, there is nature on your doorstep.



Common cranes soar above the Norfolk Broads.

HIGHLY COMMENDED

JOHN WATSON

Norfolk, UK

The Waterland

http://thewaterland.com

I first visited the Norfolk Broads on a boating holiday when I was six years old and didn't want to leave. Many people think of the Broads as somewhere to go boating or fishing, but to me it is a unique environment full of wildlife and steeped in history.

Green turtle spotted in the Galápagos.

HIGHLY COMMENDED

EMMA CATON

London, UK

The Wildlife Channel

https://thewildlifechannel.co.uk

I love writing about my best wildlife experiences, as well as filming and sharing videos online. My year ended on a high, swimming with green turtles in the Galápagos Islands. I was inches away from them and they didn't seem to notice!

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AGENDA

» UNDERSTAND THE ISSUES | BE PART OF THE SOLUTION

ANALYSIS

CARING FOR SICK AND INJURED WILD ANIMALS

● WHY THE HUMBLE HEDGEHOG REALLY NEEDS OUR HELP - SEE P60

Cheetahs may be more vulnerable than other predators because 77 per cent of their habitat is outside of a protected area.

Frans Lanting/FLPA

FAST-TRACKING TO EXTINCTION

CONSERVATIONISTS RAISE ALARM OVER CHEETAHS BECAUSE THEY REQUIRE SUCH LARGE LAND AREAS TO LIVE.

The global wild population of the world's fastest land animal may be as low as 7,000 individuals, new research has concluded.

Scientists have called for more "landscape-level efforts" to protect cheetahs because they are more vulnerable to going extinct than previously realised.

Dr Sarah Durant – speaking to *BBC Wildlife* from the West African state of Benin where she is working on a joint ZSL/Panthera project to establish how many cheetahs there are in the W-Arli-Pendjari ecosystem in the north of the country – said the species posed unique problems for conservationists.

"Because they need such large tracts of habitat – much more than lions, for example – their survival depends on their existence outside as well as inside protected areas," Durant said. "Serengeti National Park alone supports a population of more than 3,000 lions, nearly half the remaining global cheetah population."

One of the key problems for cheetahs is overhunting of their prey. In Zimbabwe, numbers have crashed from 1,200 to 170 individuals in 16 years, a decline of 85 per cent.

"The land reform programme and the economic recession that followed reduced opportunities for wildlife-based land use," Durant said. "The unsustainable use of natural resources, with more people resorting to hunting for protein to supplement their diets, is another problem."

The stronghold for the species is still southern Africa (especially Botswana and Namibia, where about 70 per cent are found), and to a lesser extent, East Africa. Populations also persist in West and North Africa – for example, Algeria, Benin, Burkino Faso and Chad, though the total population in Benin may be as few as 25.

The nature of cheetahs means there are many areas in this part of the range where their presence is suspected but not proven, but discovering new populations would not drastically change the overall picture. "In the Sahara, we documented densities as low as one per 4,000km^2," Durant pointed out. **James Fair**

DID YOU KNOW?

An Asian cheetah subspecies still survives in Iran, though no more than 50 individuals. It was once found from the Mediterranean coast to India.

FIND OUT MORE

Cheetah Range Wide Conservation Program **www.cheetahandwilddog.org**

The matriarch of the Southern resident group – Granny or J2 – has probably died, aged 105.

CENTURION ORCA SUCCUMBS

The issue of how long an orca lives has been highlighted by the deaths of two individuals.

The deaths of two orcas, or killer whales, has cast a spotlight on separate aspects of this species' place in the world.

First came the news in late December 2016 that Granny or J2 – who was estimated to be 105 years old – had not been seen since mid-October, and was presumed to be dead.

Granny's longevity is one reason her death made headlines, but there was another – she was part of the Southern resident group that lives off the west coast of North America.

These killer whales have been studied since 1976, but scientists fear they are in irreversible decline. "Dwindling salmon stocks and shipping threaten the survival of this population," Darren Croft from the University of Exeter told BBC News.

Writing on the website of Whale & Dolphin Conservation, Melisa Pinnow, of the Center for Whale Research, said matriarchs such as Granny play a vital role in killer whale groups because they are a source of knowledge.

"She knew the timing of salmon runs, the maps for finding food, the safe places to evade detection and the traditions of her family," Pinnow said.

The other killer whale that died was Tilikum, a captive orca at SeaWorld believed to be 36. He became the focus for a campaign to stop the keeping of killer whales in captivity after the release of the documentary *Blackfish* in 2013.

Commenting on his death, SeaWorld said Tilikum was "near the high end of the average life expectancy for male killer whales".

According to the US National Oceanic and Atmospheric Administration (NOAA), "males typically live for about 30 years, but can live as long as 50–60 years". Females – as we know, thanks to Granny – can live much longer. **James Fair**

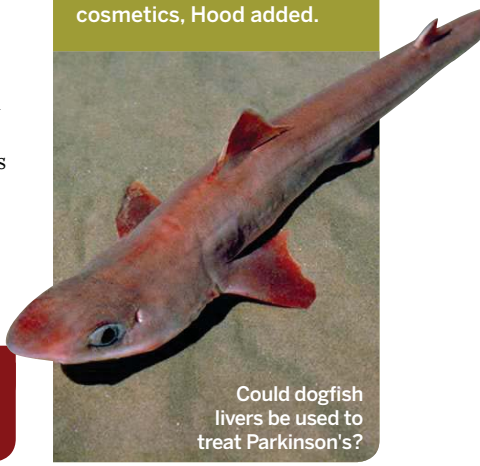
FIND OUT MORE
Center for Whale Research:
www.whaleresearch.com

DOGFISH LIVER REMEDY

Research suggesting an amino acid – known as squalamine – extracted from the livers of dogfish can be used to treat Parkinson's disease should act as an incentive to protect them, according to the Shark Trust's director of conservation Ali Hood.

"Dogfish only mature after 20 years or so and have pregnancies lasting 24 months," Hood said. "Certain species are under significant pressure in some regions, and this scientific breakthrough is yet another reason why these remarkable sharks should be handled with care."

Shark liver oil has been used over the centuries in streetlights, to lubricate machinery and in cosmetics, Hood added.



Could dogfish livers be used to treat Parkinson's?

Orca: Marli Wakelling/Alamy; dogfish: Joyce Photographics/Photoshot; shelducks: David Woodfall/naturepl.com

CONSERVATION briefing

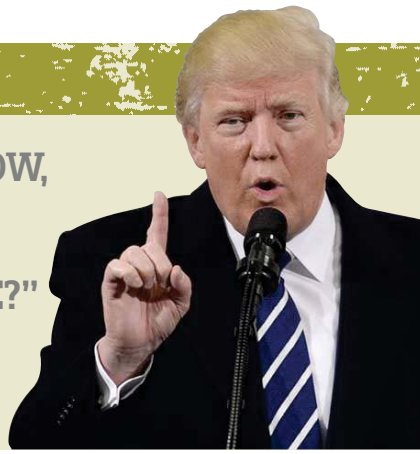
FRENCH WOLVES

A pair of wolves has been living in the Rambouillet Forest, south-west of Paris, for at least a year, according to the French group Alliance avec les loups (Alliance with wolves). The alliance's Manoël Atman said another wolf was living in the Essonne department, south of the capital.

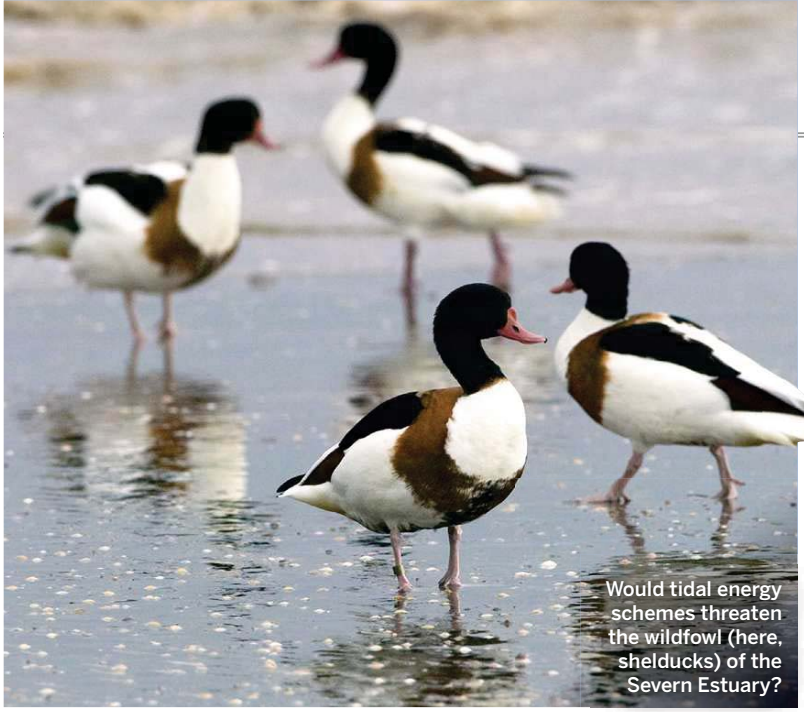
Wolf: Lassi Rautiainen/NPL

"WOW, 25° BELOW, RECORD COLD SPELL. GLOBAL WARMING, ANYONE?"

New US president **Donald Trump** *tweeted this in February 2015. Reports suggest he wants to drop out of the Paris Agreement on limiting emissions of greenhouse gases.*



Trump: Pool/Getty; leopard: UrmasPhotoCom/Getty



Would tidal energy schemes threaten the wildfowl (here, shelducks) of the Severn Estuary?

TIDAL QUESTIONS

Tidal lagoons contribute energy but what impact do they have on birds and fish?

Are tidal lagoons a threat to the UK's marine wildlife – and fish such as salmon and sea trout, and wildfowl especially?

A review has concluded they can make a cost-effective contribution to our electricity supply, alongside other renewable technologies.

There are plans for a lagoon in Swansea, and the Severn Estuary has long been promoted as a potential location, too.

But the Severn's mudflats support some 85,000 waterfowl over the winter, as well as migrating salmon and sea trout.

Referring to the government-commissioned Hendry Review on tidal lagoons, The Wildlife Trusts said that recommendations for a high-level of monitoring of environmental impacts should be heeded.

"We are also pleased the report recommends a pause between Swansea becoming operational and other plans for lagoons starting," it said. "We would like to see at least eight years' pause to cover two fish-spawning cycles."

60% **The proportion of the world's 504 primate species – the group of mammals including bushbabies, lemurs, monkeys, apes and humans – that is threatened with extinction, according to leading scientists.**

LEOPARD ALARM

Camera-trap footage taken in China's Tibetan Plateau region has shown both snow leopards and leopards in the same area, the first time this is known to have happened. Scientists say climate change could push the tree line higher and lead to the species' habitats overlapping.

BEYOND THE headlines

SEPARATING FACT FROM FICTION

A RECENT ITEM ON *COUNTRYFILE* SUGGESTED THERE IS GROWING PRESSURE FROM ANGLERS TO CULL OTTERS, BUT DR DANIEL ALLEN OF THE UK WILD OTTER TRUST DISAGREES.

Are otters a problem for freshwater fisheries?
Predation can eat into the profits of those with vested interests in fish, but measures can be taken to prevent otters from taking stock from still-water fisheries.

What measures?
A physical barrier that otters cannot climb over, pass through or under is the most effective deterrent for managed stillwater fisheries and fish farms. Otter-proof fencing specifications have become standardised as part of Natural England licensing conditions. Otter-feeding ('sacrificial') ponds can also be effective.

Is there pressure from anglers to cull otters that become a problem?
There is no pressure for an otter cull from the Angling Trust, and such attitudes are not representative of that community. Calls to cull otters have bubbled to the surface recently, but these are extreme views from a minority. The BBC One *Countryfile* feature appeared to suggest that calls to cull otters are the norm. They are not.

How is the UK Wild Otter Trust (UKWOT) helping?
The Trust recently secured the first ongoing 'class licence' to capture and transport live Eurasian otters trapped in well-fenced fisheries in England. UKWOT has five trained operatives and, since October 2016, 10 fenced fisheries have approached us to help them. UKWOT is collaborating with the Angling Trust, Natural England, the RSPCA and otter specialists to find solutions that benefit both otters and angling.

Commercial fisheries can be protected from hungry otters.

Do you think these measures will quell any calls for a cull?
There will always be individuals who call for culls over coexistence. UKWOT has taken a pragmatic approach to fish predation by otters, and it shows that a protected species can be managed in a non-lethal way at a local scale in England.

DR DANIEL ALLEN is policy advisor for the UK Wild Otter Trust
www.ukwildottertrust.org
● Want to comment? Email wildlifeletters@immediate.co.uk

Otter: Sui Xin Daphne Wong/Alamy

EXPERT BRIEFING

CONSERVATION INSIGHT

MARINE IGUANA

DESCRIBED BY CHARLES DARWIN AS "IMPS OF DARKNESS", MARINE IGUANAS ARE UNIQUE AND NEED PROTECTION SAYS AMY MACLEOD.

The predation of just-hatched marine iguanas by racer snakes as seen on *Planet Earth II* may have been dramatic and heart-wrenching on screen, but it probably has little impact on the species as a whole.

The world's only sea-going lizards, marine iguanas are endemic to the Galápagos Islands and found on all 13 of the major islands, with the largest numbers on Fernandina and Isabela.

In 2004, scientists made "very rough estimates" for the populations of these islands as 120,000 and 40,000 respectively. Other islands have substantially smaller populations – San Cristóbal, for example, has fewer than 400.

While there are natural limits on population due to the availability of the red and green algae it almost exclusively feeds on, habitat for courtship and breeding and suitable locations to lay eggs, it is the human impacts that conservationists are more concerned with.

The presence of non-native domestic cats throughout the Galápagos is believed to be a significant threat on some islands, while feral dogs can be a problem too, but are generally more visible and easier to eradicate.

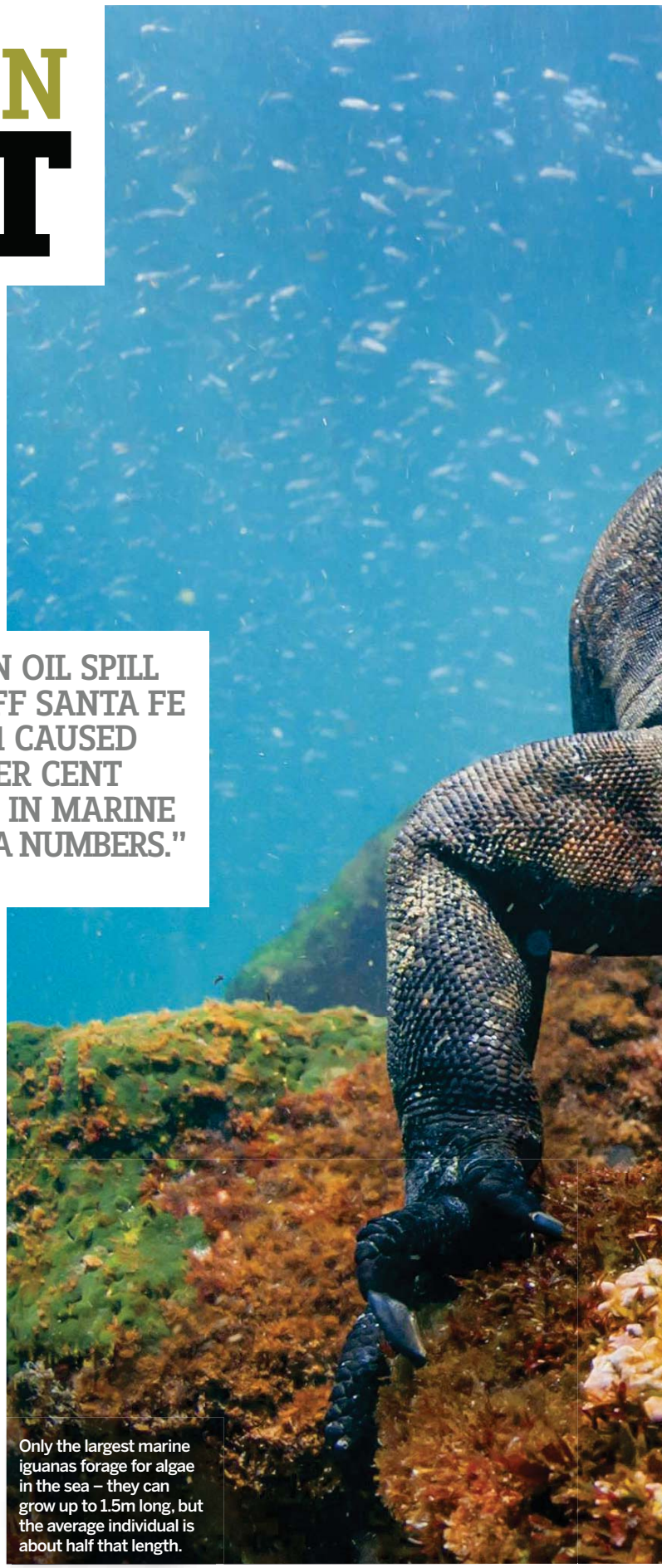
Marine pollution has been shown to have a huge impact on marine iguanas: an oil spill off San Cristobal in 2001 caused a 60 per cent crash in iguana numbers on Santa Fe island where the species was being monitored. It's thought the oil poisoned the gut bacteria that enables the iguanas to digest algae.

Finally, El Niño events – where there are temporary increases in sea surface temperatures – have even greater impacts, causing population crashes of 90 per cent by killing the algae the iguanas eat. Though the process is natural, and numbers rebound, climate change may be increasing the severity of these episodes. It is feared a severe El Niño could completely kill off small populations.

> "AN OIL SPILL OFF SANTA FE IN 2001 CAUSED A 60 PER CENT CRASH IN MARINE IGUANA NUMBERS."

DR AMY MACLEOD carried out her Phd on the evolution and conservation of marine iguanas.

FIND OUT MORE
Galapagos Conservation trust
http://bit.ly/2jy0wrc



Only the largest marine iguanas forage for algae in the sea – they can grow up to 1.5m long, but the average individual is about half that length.

Tui De Roy/Minden Pictures/Alamy

FACT FILE

MARINE IGUANA

AMBLYRHYNCHUS CRISTATUS

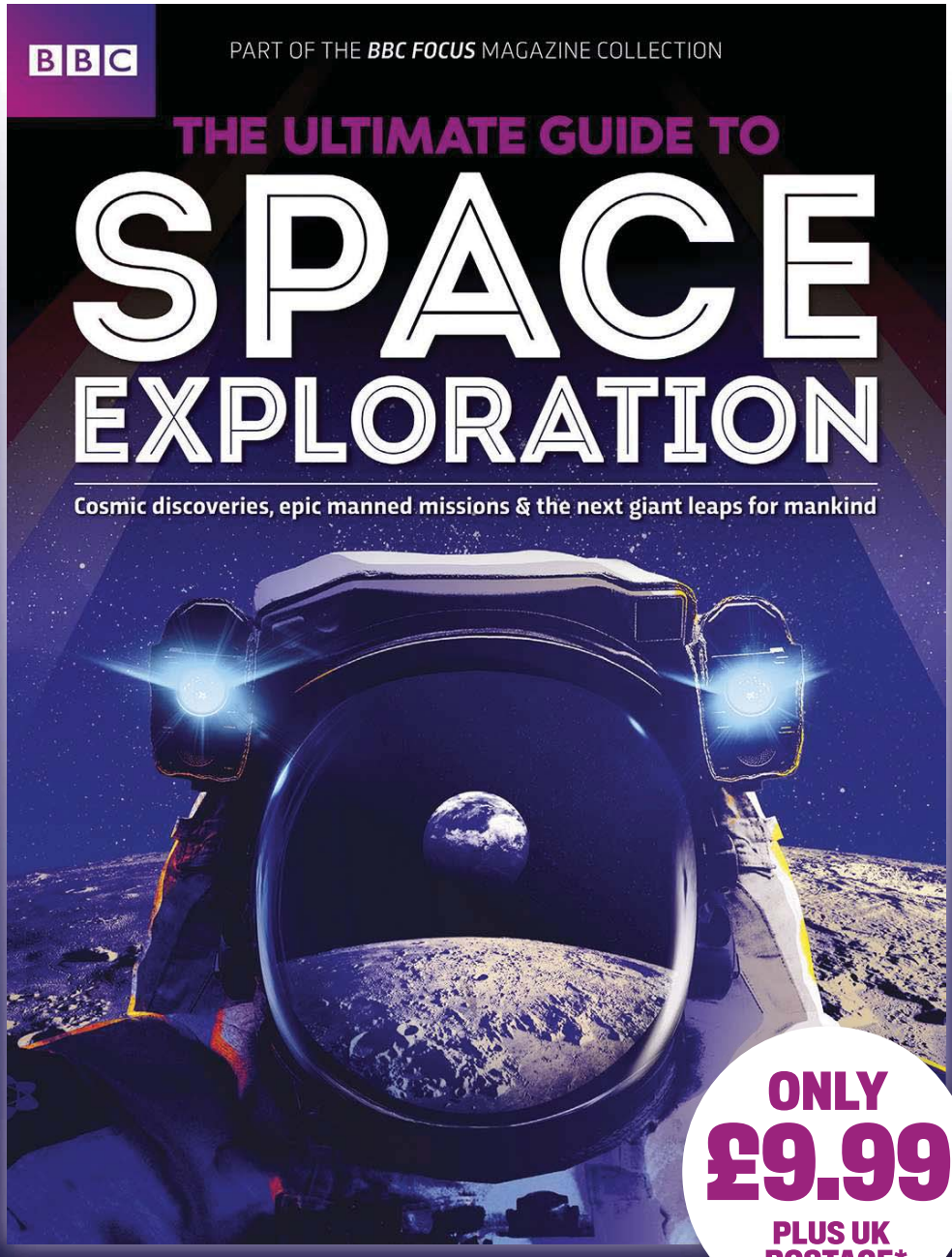
HABITAT Coastal areas of the Galápagos Islands in the Pacific Ocean.

DIET Almost exclusively red and green algae, which they forage for at low tide; larger animals will feed in the sea at depths of up to 25m.

THREATS Invasive species, pollution and increasing severity of El Niño events.

IUCN RED LIST STATUS
VULNERABLE

FROM THE MAKERS OF BBC FOCUS MAGAZINE



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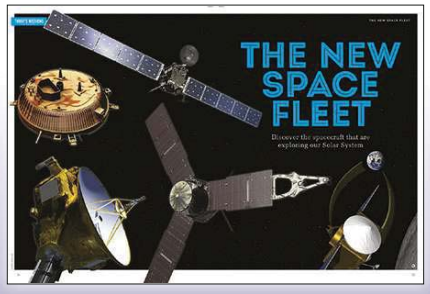

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Mark Carwardine's AT A GLANCE...

13

FISHERIES BYCATCH

WHAT IS FISHERIES BYCATCH?

It is the term used for the staggering number of animals caught incidentally during fishing operations around the world – animals that fishermen usually do not want, cannot sell, or are not allowed to keep. They are simply thrown back over the side, dead or dying. Bycatch is one of the most serious conservation problems in the world today – one that many experts describe as the 'biggie'.

WHY DOES IT HAPPEN?

Many fishing techniques are shockingly indiscriminate and few can target a single species without catching other species by mistake. So wherever there is fishing, there is bycatch. Thousands of miles of highly efficient nets and lines are set in the world's oceans every day that catch virtually everything in their paths. Another problem is 'ghost fishing', in which unimaginable quantities of fishing gear are abandoned, lost and discarded in the world's oceans every year; they are out of control, yet continue to fish.

HOW MANY ANIMALS DIE?

Millions every year. There are few precise figures, because much of the damage is done out of sight on the high seas, but it is estimated that bycatch accounts for a staggering 40 per cent of global marine catches. We do know that more than 300,000 whales, dolphins and porpoises, hundreds of thousands of marine turtles, 300,000 seabirds and some 50 million sharks die every year. Vast numbers of juvenile fish, including the young of commercially valuable species, are also caught and discarded for being undersized. Even invertebrates living on the seafloor do not escape – North Sea bottom trawl fisheries alone are estimated to discard up to 150,000 tonnes of invertebrates annually. Bycatch is one of the main reasons China's Yangtze river dolphin is now extinct and it is threatening the survival of everything from the vaquita (a rare porpoise) and the North Atlantic right whale to 15 out of 22 species of albatross.

DOES THE FISHING INDUSTRY CARE?

Notorious for its catastrophic mismanagement of fish stocks around the world, and pampered by governments who blatantly ignore all scientific advice, the fishing industry has been slow to respond to bycatch. But it also takes a toll on fishing operations, resulting in wasted time, damaged gear, reduced catches and fishing restrictions, so the industry does sometimes have a vested interest in helping. The good news is that, where fisheries have enforced strict regulations, the results have often been substantial reductions in bycatch.

WHERE HAS IT BEEN REDUCED?

The best known example is the tuna-fishing industry, which was directly responsible for the deaths of 6 million dolphins in the eastern tropical Pacific but, thanks to public pressure and new regulations, it has reduced the scale of the slaughter dramatically. More recently, albatross deaths around South Georgia have been all but eliminated (although large numbers are still being killed outside territorial waters).

A fisherman shovels bycatch overboard, including American yellowtail flounder and little skate.

> BYCATCH IS ONE OF THE MOST SERIOUS CONSERVATION PROBLEMS IN THE WORLD TODAY – ONE DESCRIBED BY MANY EXPERTS AS THE 'BIGGIE'.

WHAT ARE THE BEST SOLUTIONS?

This depends on everything from the fishing techniques used to the affected species, but might involve adapting management regulations, directing fishing away from conflict hotspots, seasonal closures of fishing grounds and reducing fishing effort. But solutions also include relatively simple and inexpensive modifications to fishing gear and techniques, such as turtle excluder devices, bright orange streamers to scare birds away and acoustic alarms, called 'pingers', which can alert animals to the presence of nets.

WHAT OF THE FUTURE?

Much relies on people in the fishing industry with a conscience and politicians prepared to stand up for wildlife, but a great deal could be achieved by more individuals making careful and informed choices about which seafood they buy.

FIND OUT MORE
Find out more about bycatch at **www.bycatch.org**

MARK CARWARDINE
is a frustrated and frank conservationist.
Every month he demystifies some of the most important issues affecting the world's wildlife and assesses the organisations that protect it.

Would you like to comment? Email **wildlifeletters@immediate.co.uk**

Jeff Rotman/naturepl.com

CARING FOR WILD CRITTERS

THOUSANDS OF WILDLIFE CASUALTIES ARE TAKEN TO VETS AND ANIMAL HOSPITALS EVERY YEAR. WHY DO THEY NEED TREATMENT AND WHAT HAPPENS NEXT, ASKS JAMES FAIR?

Coming back from a night out several years ago, Toni Blythe saw a hedgehog trying to burrow under her garden fence. "I gave it a helping hand," she told *BBC Wildlife*, and since that day, she's become a regular hedgehog activist and advocate.

For a couple of years now, Toni has been putting out food for the wild hogs in the garden of her semi-rural home between Leeds and York and, in the past few months, she's rescued five young hedgehogs. One was discovered by her partner in the local park, the others she found at the bottom of the garden.

"We found the first one and it was really underweight – just over 200g, and they should be about 600g," she said. "We looked again the next night and found three more, and all of them were underweight."

All the hedgehogs went to small, local wildlife hospitals, where they were cared for until it was warm enough to release them. "I felt a bit guilty about taking them from the wild," Toni recalled, "but with the freezing weather at the time, they wouldn't have made it."

> "THE BRITISH PUBLIC TAKES 31,000 HEDGEHOGS TO VET PRACTICES TO BE TREATED EVERY YEAR."

Toni is not alone in wanting to help Britain's favourite mammal. Statistics published in *Veterinary Record* at the end of 2016 suggest the public takes a staggering 31,000 hedgehogs to vets every year, and this figure does not include those that go to wildlife hospitals or other carers.

HELP FOR HOGS

Vale Wildlife Hospital, near Tewkesbury in Gloucestershire, for example, sees an average of 800 hedgehogs pass through its doors every year, and when *BBC Wildlife* visited in mid-January, it was a temporary home to some 300 animals.

"We always overwinter a lot of hedgehogs because the underweight autumn juveniles get picked up," said Vale Wildlife's founder Caroline Gould, "though we've never had this many before."

Caroline said warmer winters may be both a blessing and a curse – on the plus side, they don't kill underweight animals, but as a negative, they interfere with the hedgehogs' normal hibernation patterns. Many of those that are picked up are the offspring of second litters that haven't had sufficient time to build up fat reserves, she believes. There are also many victims of over-enthusiastic strimmers and vehicle collisons.

"There's much greater awareness of hedgehogs now," Caroline pointed out. "There's always something in the news

Many hedgehogs are taken to wildlife hospitals because they are underweight, but injuries such as lacerations from strimmers are common, too.

Manx shearwaters are mainly brought in for treatment after being blown from their migration route by strong winds.

about them and there's lots of good advice. People take more notice when they see one and do something about it."

INCREASE IN NUMBERS

Lucy Bearman-Brown, who is in the midst of a Phd that is looking, in part, at how many hedgehogs go through care and rehabilitation each year, said Vale's experience was consistent with what she has heard. "There's been so much about hedgehogs declining, but rescue centres are seeing many more than ever before, and we don't understand why this is," she said. Lucy wants to hear from any hospitals or individuals who care for hedgehogs on a regular basis (see p63 for contact details.) Whether it's a hedgehog or a sparrowhawk – Vale took in 21 of these in 2016 – the British certainly have a soft spot for wild animals that are injured or poorly. In her paper for *Veterinary Record*, Emily Barnes calculated that between 90,000 and 173,000 animals are taken for treatment a year – if the true figure is nearer the upper limit, that's more than double previous estimates.

The revelation raises some difficult issues. Who pays for treating this huge workload and what do you do with the thousands of animals that are so badly injured they can never go back to the wild? ▶

It's fine to feed your hedgehogs but don't let them become reliant on you.

RELEASING MRS TIGGYWINKLE

How to re-release a hedgehog to give it the best chance of survival.

- **ALWAYS TRY** to return a hedgehog to where it was found unless there are obvious reasons not to do so.
- **PUT OUT** half a tin of meaty dog or cat food each night until no longer taken.
- **TRY AND KEEP** the food out of reach of your local cat population – one way to do this is to place the food in a feeding dish underneath a paving slab supported by two bricks (so a hog can get at it, but a cat can't).
- **GIVE YOUR** hedgehog a hibernation and sleeping place – you can buy these in garden centres or build your own.
- **PUT IT** in a shady, sheltered spot facing away from the worst of the weather (in a shrubbery works well). If you put it in a place that gets direct sunlight, hedgehogs won't use it.
- **GET RID** of all things that might endanger a hedgehog: any poisons (slug pellets or warfarin, for example) and garden netting, including things like football goals. If you use humane traps, you need to check them at least twice (but ideally more) a day.
- **IF YOU** have a garden pond, make sure a hedgehog has access to it, but can also get out if it falls in – you can do this using chicken wire or a wooden plank.
- **KEEP AN EYE** on your dog, if you have one, especially at night when hedgehogs are active.

Clockwise from top left: MBJ/Alamy; Matt Cardy/Getty; Konrad Wothe/naturepl.com

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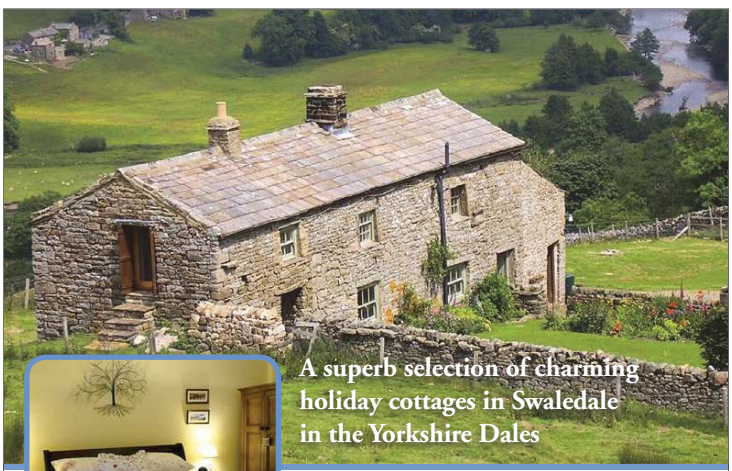
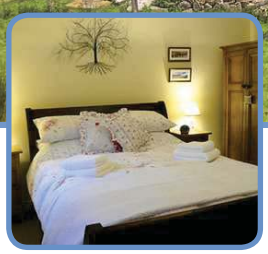


A superb selection of charming holiday cottages in Swaledale in the Yorkshire Dales



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Wildlife hospitals need to get hedgehogs up to an optimum weight before they can be released.

On the first point, it was clear from Emily's research that people who took an injured wild animal to a vet expected them to treat it for free. Most vets don't regard this as a problem, though they may ask for help with costs, but there could be other consequences. "It may influence how far you go with, for example, rehabilitation," she said.

Vale Wildlife explicitly doesn't charge for any of the animals it takes in. "We make it clear to everyone that we run on donations but we would never say we're not taking that animal unless you pay," said Caroline.

On the second issue, she is equally clear. "We are not a sanctuary, and we don't believe that disabled wild animals should be kept in captivity, so they are put down," Caroline said. "We are very honest with people, and some don't like it."

FIT FOR RELEASE

Different species can cope with different levels of disability. As long as a pigeon or dove can fly from A to B with what she calls "a limp", then it can probably survive. A buzzard would need to be "99 per cent" fit before being released, but if a kestrel isn't 100 per cent, it would be unable to hunt effectively.

> "WE RUN ON DONATIONS, BUT WE'D NEVER SAY WE'RE NOT TAKING THAT ANIMAL UNLESS YOU PAY."

It is something that many vets accustomed to domestic animals can find hard to deal with. Vale's in-house vet Tim Partridge used to have a general practice and rarely came across wild animals.

"When I first started here, I had to adopt a totally different mindset," he said. "In a domestic situation, you rarely euthanase, but with wild animals you have to assess whether it is ever likely to be fit enough for release."

In 2016, Vale put just under 30 per cent of its intake to sleep. "A large number of these were euthanased on arrival due to the extent of their injuries, where all we could hope to do was to save further suffering," Caroline said.

DUTY OF CARE

Another issue – not addressed by Emily Barnes' paper – is to what extent rescuing wild animals is interfering with nature. Should we not, some might argue, let natural events take their course, even if an animal could die?

But most of what Vale deals with, Caroline pointed out, isn't as a result of what nature does, but people. "Whether it's something that's been hit by a car, or been strimmed in the garden or been caught by a cat, which is a big issue in spring and summer, we're causing these problems and we've got a duty to do something," she said.

Toni Blythe would echo these words. She hopes she and her family will be releasing the hedgehogs they rescued last year once the weather has warmed this spring. "We know hedgehogs are under threat," Toni said. "I keep seeing new houses being built around us. Hedgehogs don't harm anyone. If you can help one out, take it in so that it doesn't starve to death or chuck a few quid at a wildlife hospital, that's got to be good."

FIND OUT MORE

The British Hedgehog Conservation Society **www.britishhedgehogs.org.uk**

Lucy Bearman-Brown's research **www.facebook.com/HedgehogResearch**

THE DOCTOR WILL SEE YOU NOW: WHO COMES IN TO VALE AND WHY

Vale Wildlife Hospital took in 4,535 casualties in 2016, including 79 species of wild bird (and quite a few domestic ones), 27 species of mammal (including the odd domestic cat or dog), 9 species of reptile (most of them non-native and probably escaped pets such as a royal python), three species of amphibian and a goldfish.

HEDGEHOG

Number admitted: 1,014
Primary reason: Most hedgehogs brought into Vale come in during the autumn and winter and are juveniles from the year's second litter that are underweight to cope with the coldest part of the year. Hedgehogs represent 22 per cent of all admissions to the hospital.

WILD BOAR

Number admitted: 5
Primary reason: Luckily for staff at Vale Wildlife, all the wild boar that were brought in were piglets and not adults. They all came from the Forest of Dean (where wild boar have re-established themselves from farm stocks) and were victims of road traffic collisions.

BUZZARD

Number admitted: 73
Primary reason: Buzzards are mostly brought in after being poisoned, shot (often with an air rifle) or when they have broken a bone in one of their wings from a collision. If fractures are clean they can mend in a week or 10 days, and the animal can be returned to the wild.

MANX SHEARWATER

Number admitted: 7
Primary reason: Gloucestershire isn't known for its Manx shearwaters – all the ones admitted to Vale Wildlife came from the coast of South Wales during the autumn when birds are supposed to be heading to Brazil for the winter, but are blown off course by strong winds.

Top: Paul Hobson/FLPA; hedgehog: Staffan Widstrand/NPL; boar: Arco Images/Alamy; buzzard: David J Slater/rspb-images.com; manx: Matt Cardy/Getty

Photo credit: Fotolia

Life on the edge... in The Arctic

To see a polar bear striding far out across a wilderness of Arctic ice is one of the most moving experiences nature can offer. Polar bears have a special attraction – because of their size and strength, the loneliness of their lives and the peculiar, unpredictable fragility of the beautiful landscape they inhabit.

Says naturalist, Stephen Mills: "My own unforgettable polar bear sightings have all been amongst the ice-floes around Svalbard. This is the best place in the world to see them. More remote and romantic and less commercial than Churchill, the region still supports a strong population of several thousand individuals."

Svalbard is 500 miles from the North Pole, and the closest place for you to observe these magnificent creatures and other Arctic specialties in the wild. The only entirely terrestrial mammal is the Spitsbergen Reindeer. Other mammals found here rely in part or entirely on the sea – Arctic fox, polar bear, walrus, bearded, harp and ringed seals. Several whale species are found in the waters and huge colonies of seabirds nest on the islands and sea cliffs – minke whale, Greenland whale, blue whale, fin whale, common and king eider, pink-footed goose, kittiwake, ivory gull, Brünnich's Guillemot.

The best Arctic experience is observing polar bears from the smallest 1A icebreaker vessels that can sail in to remote pack ice far away from any human habitation and other ships. Walking out on to the tundra and navigating around ice floes in Zodiacs for close up encounters with walruses and seals encapsulates life on the edge. The best time of year to see polar bears off northern Svalbard is June, when the ice is receding and there is 24 hours daylight - a unique experience in itself.

About Spencer Scott Travel

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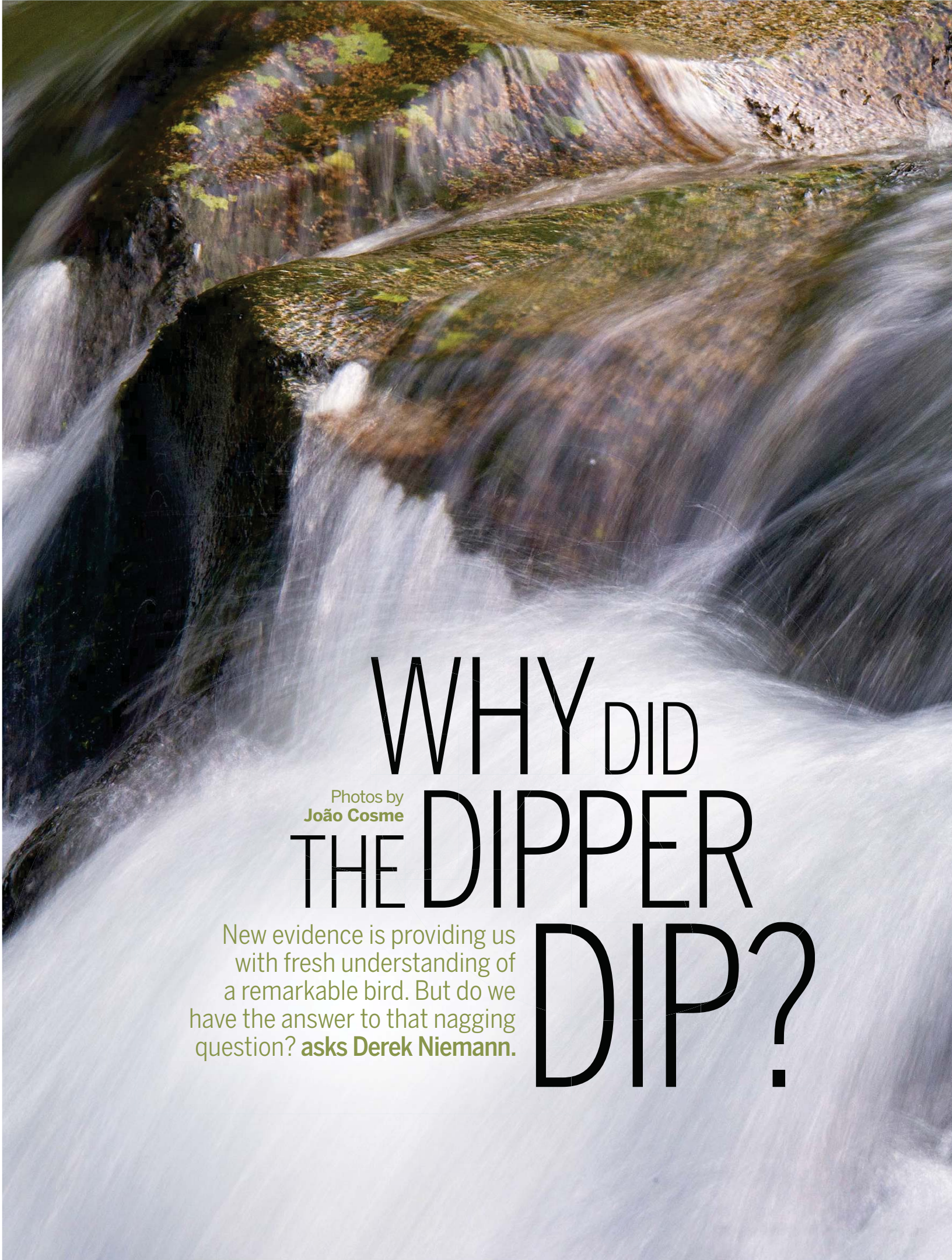
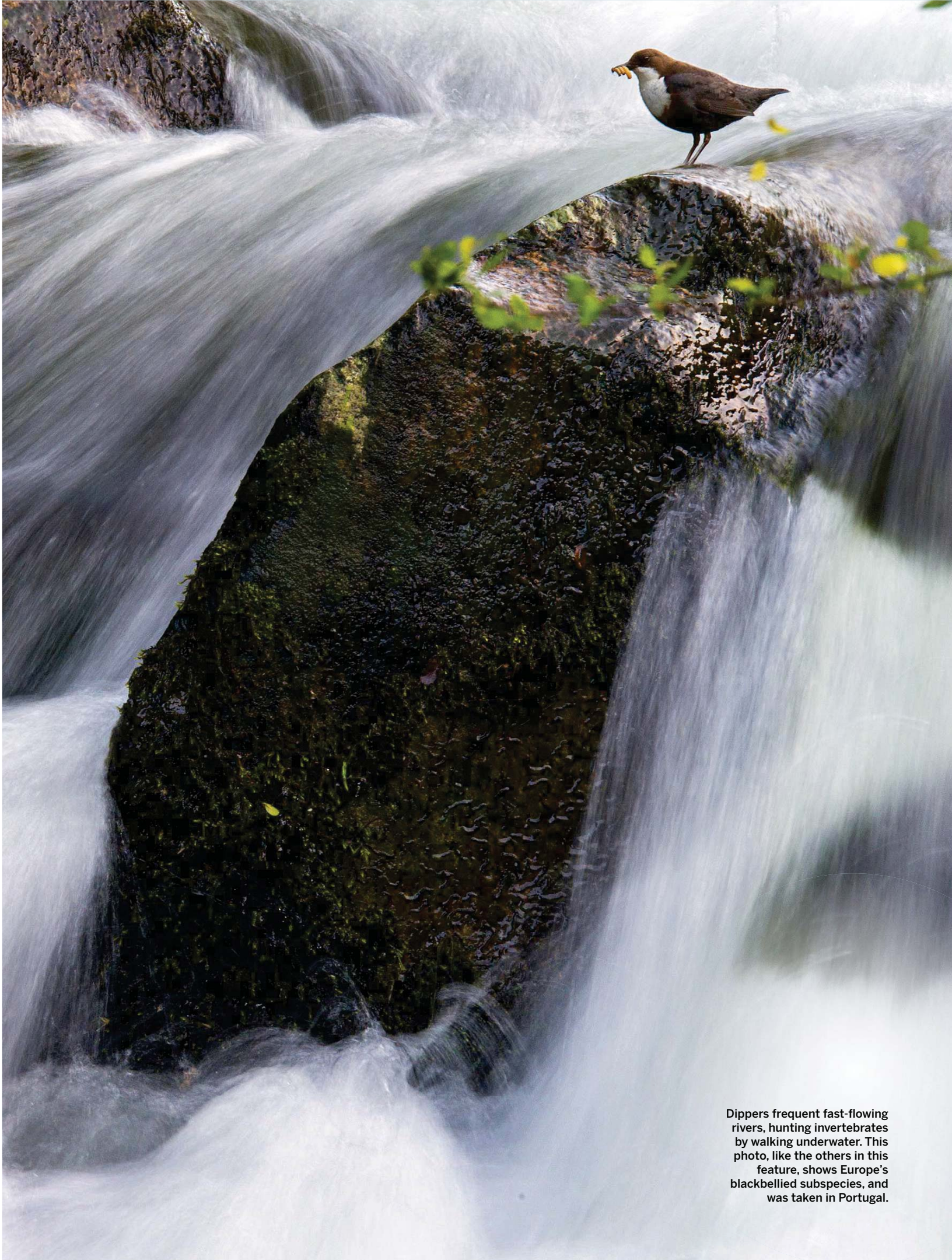


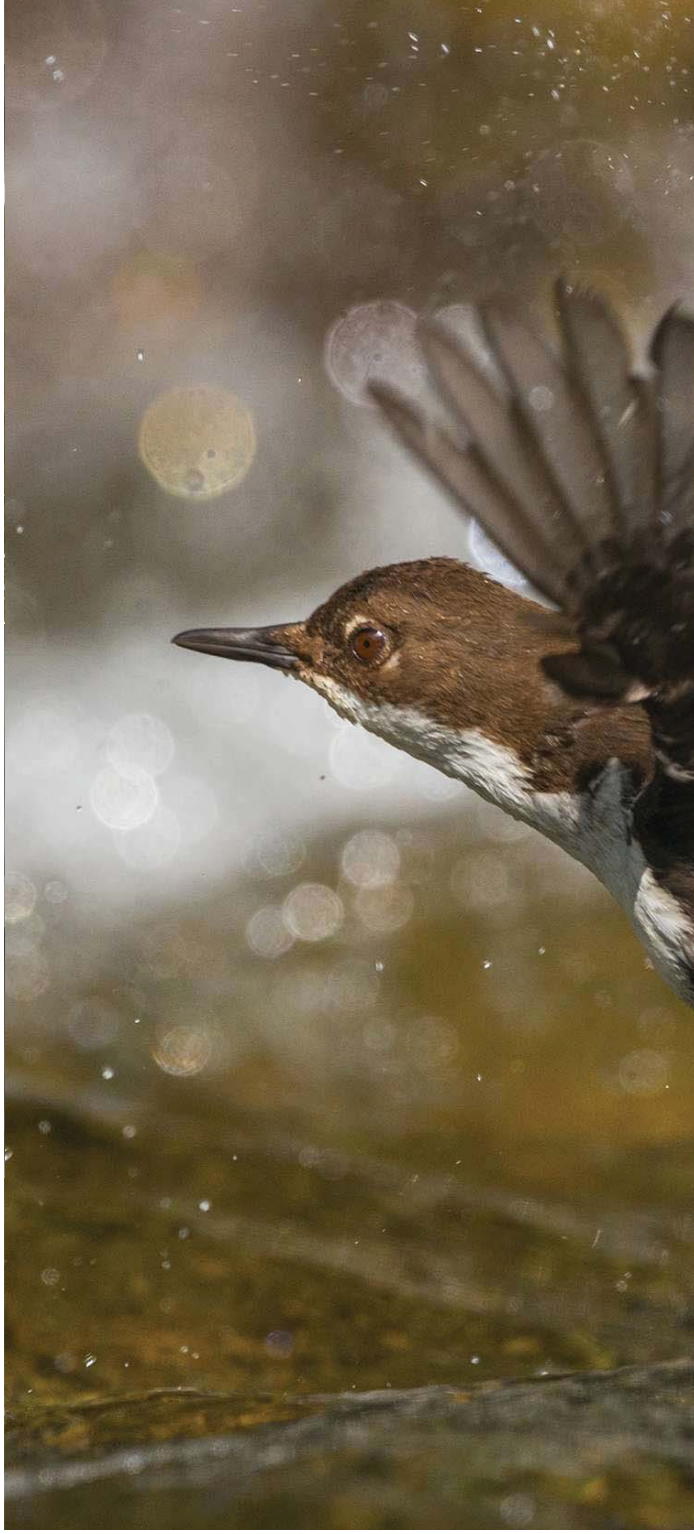
WHY DID THE DIPPER DIP?

Photos by **João Cosme**

New evidence is providing us with fresh understanding of a remarkable bird. But do we have the answer to that nagging question? **asks Derek Niemann.**



Dippers frequent fast-flowing rivers, hunting invertebrates by walking underwater. This photo, like the others in this feature, shows Europe's blackbellied subspecies, and was taken in Portugal.



Top left: a dipper surfaces with prey wriggling in its beak. Above: an adult feeds a hungry grey juvenile. Dippers breed early in the year, often laying four or five eggs before the end of February.

Looking into the maelstrom of an upland stream, our eyes go white-water rafting over the rapids and our ears are overwhelmed by a roaring, hissing torrent. Even though our senses are drowned, our attention is grabbed by a diminutive figure on its little boulder of a stage – a bob, a curtsey, the up and down flash of a white-breasted bird, a wren-like cock of the tail. Britain has its share of tail-wagging, head-flicking birds, but nothing dips quite like a dipper.

Each dip is accompanied by a blink of its eye, the white-feathered eyelid winking like an indicator light. We can't help having our heads turned by these repetitive gestures.

Many scientists offer the slightly unnerving thought that the dipper *wants* you to see it. In dipper-meets-dipper situations, the dip is a show of strength, a kind of 'look how many bench presses I can do'. It draws the opposite sex, and it warns off a rival. And this is a display meant for others with more deadly intent. Just as a hare will stand up before a fox to let it know it's been spotted, so the dipper dips to the binocular-clad figure on the bank. It's as if it's saying I've clocked you, so don't think you can catch me.

IN DIPPER-MEETS-DIPPER SITUATIONS, THE DIP IS A SHOW OF STRENGTH, A KIND OF 'LOOK HOW MANY BENCH PRESSES I CAN DO'. IT DRAWS THE OPPOSITE SEX AND WARNS OFF A RIVAL.

If only things were this straightforward. An alternative theory for the dipper's *shtick* argues the exact opposite. Both the dipper and the grey wagtail, with its erratic tail-bobbing, are – so the theory goes – making movements to blend in with the turbulence of their environment. A predator might spot an object that stays still, but cannot easily pinpoint it in a whole scene of permanent flux.

So just why does the dipper dip? It sounds like a joke and perhaps the joke is on us. Stephanie Tyler has studied dippers intensively for 40 years, longer than anyone else on the planet. She has watched all five species of this remarkable family, from the Himalayas to the Rocky Mountains and the rivers of South America.

Above: uniquely among songbirds, dippers have evolved a superb ability to hunt underwater. Their plumage is dense and well-oiled.

Every one of them dips. What's her conclusion? "It is the question I am asked more than any other. Everybody always asks me why they do it and there are all sorts of hypotheses, but nothing is really definite."

For all its fancy and, it seems, inexplicable dance moves, we name the dipper after one of its less impressive characteristics. There is far more to shout about when it leaps offstage: the real magic happens below the water's surface.

The dipper looks an unlikely candidate for the claim to be 'Britain's only aquatic songbird'. It stands on its rock looking not so much like a streamlined submariner as an overfed blackbird, and it's about the same size. However, freshwater biologist Steve Ormerod has worked on this species for 34 years and declares: "Dippers are just the most fantastically adapted organisms."

A third white eyelid protects a dipper's eyes underwater.

THE NICTITATING MEMBRANE

In common with all other birds, the dipper has what is effectively a windscreen – a near-transparent third eyelid known as the nictitating membrane, which it draws across its eye. This membrane even acts like windscreen wipers, as it has the extra function of moistening and cleaning the front of the eye. Rapid blinks of this third eyelid while a bird is moving, especially when it is leaning over to feed or forage, suggest that it has an important role in protecting the eyes.

Some of these adaptations are invisible. The bird has unusually high haemoglobin levels in its blood, enabling it to store large amounts of oxygen on underwater dives. A special flap seals its nose from inrushing water, and it has exceptionally well-developed muscles that control the shape of its lenses, helping it to surmount the visual difficulties of refraction in water.

Other adaptations can be felt by a scientist who has handled thousands of dippers in his career. Short but strong flipper-like wings beat the bird down to the bottom and then long toes with powerful claws act like crampons as it walks along on the stony river bed: "Those claws grip incredibly tightly, they squeeze very, very hard," comments Ormerod, from uncomfortable experience.

SUBMARINER DISGUISE

Perhaps most remarkable of all is its wetsuit: "The feathers are extremely soft and dense," says Ormerod. "A dipper might have one and a half times as many body feathers as a blackbird. And if I'm holding one in my hand, I always show people the enormous preen gland at the base of its tail that looks almost like an engorged tick."

That preen gland means the dipper's thick, well-oiled plumage traps thousands of air bubbles underwater, giving it a uniformly silver appearance and making it less visible to prey than its chocolate brown and brilliant white feathers might otherwise suggest. Bobbing up into open air again, it shivers pearly water droplets off in an instant. Its astonishing mermaid-like qualities allow it to slip between water and air as if there was no difference between them. Surging rapids might terrify us: the dipper appears totally fearless.

Size is important. A smaller bird would be washed away when a river is in spate, a bigger bird would ▶

DIPPERS HAVE BECOME EVERYDAY BIRDS THAT CAN BE SEEN BY MILLIONS OF PEOPLE, FOR THE FIRST TIME IN PERHAPS MORE THAN 150 YEARS. IT IS SOMETHING TO BE CELEBRATED.

Above: a dipper mid-plunge. Each dive can last for up to 30 seconds. The birds also wade and will bob along with the current, a little like tiny ducklings.

be unable to squeeze into narrow fissures or duck under boulders to find prey. For the most part, dippers are hunting caddis and mayfly larvae, nymphs that are grazing algae on boulders and gravel. The larvae generally cling to the underside of rocks, where they find shelter from the currents, but no sanctuary from a hunting dipper. Some caddis larvae spin themselves silk webs to hide in. The mesh is torn apart and they are unceremoniously pulled out. Other species are dragged from the water still wearing their protective casing of leaves or tiny pieces of twigs, woven together. Armour offers no defence; the dipper shells each caddis larva by beating it repeatedly against a stone. It's as easy and messy as peeling a prawn – but they do it without fingers!

And then it dives again, spending 15–20 seconds at a time foraging, popping up with a wriggling larva in its beak, before launching itself once more into the rushing water. No wonder an old Welsh name for the dipper is 'bird of the torrent'.

FOOD FOR THOUGHT

The nature of dipper food makes this bird, in Stephanie Tyler's words, "a fantastic indication of the quality of the aquatic environment". Many caddis and mayfly larvae live only in fast-flowing, well-oxygenated rivers. Mayflies are sensitive to changes in water quality, caddis flies to changes in sediment, and so the appearance or disappearance of dippers are symptomatic of changes in river quality. This bird has become the riverine equivalent of the canary in the coalmine.

The way we have treated and mistreated upland rivers through history has played out in the fortunes of dippers. Today there are some good news stories. In our post-industrial landscapes, dippers have been recolonising formerly grossly polluted waterways through towns and

FAVOURITE FOOD: MAYFLIES

Despite their name, the 50 or so species of mayfly found in the British Isles crawl up from the depths to emerge in adult form throughout the spring and summer. The winged adults live only for a day or so – just enough time for them to mate and die. In contrast, mayfly nymphs survive for anything from a few months to a year or more. They are recognisable by a trio of extravagantly long tails almost the length of their bodies, that are sometimes mistakenly thought of as gills. The real feathery gills line up like oars in a galley along the abdomen.

Above: in the breeding season adults busily ferry billfuls of aquatic larvae for their offspring. Left: dippers are perfectly at home amid whitewater and spray, with strong claws to grip wet rocks.

cities. Lancastrian Steve Ormerod says with pride: "They're in my home town of Burnley on the River Brun, which used to run orange with colliery waste. They're also in South Wales, Teesside and in the middle of Sheffield." Dippers have become everyday birds that can be seen by millions of people, for the first time in perhaps more than 150 years. It is something to be celebrated.

DEADLY WATERS

However, there is a jarring paradox. The birds recolonising old haunts in conurbations are living with humans and receiving the by-products of our lifestyles – the sewer overflows from household waste and discharges from waste water treatment works. In tainted water, dippers are being exposed to new pollutants with ominous-sounding acronyms – PBDEs, the so-called flame retardants, as well as lingering residues of older PCBs. These are known endocrine-disrupters, affecting sex ratios (more male dippers are hatching), thyroid function, and fledgling development.

Equally worrying is the recently discovered evidence that microplastics are entering the food chain, since particles have been found in the bodies of aquatic insect ▶

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Above: a dipper flies to its nest. This domed, mossy structure is often behind a waterfall, in a stone wall or in a crevice below a bridge.

larvae. What this means for dippers is yet to be ascertained and, since they rarely live more than two or three years, it would be hard to study long-term effects on an individual.

Even more disturbing is the fact that in rural river networks, dippers are still in decline. British Trust for Ornithology (BTO) figures show a nationwide fall in numbers of 30 per cent since 1970, a trend that shows no sign of reversing. Former threats from insecticides such as dieldrin have been replaced by new ones. Intensive poultry units are among the factors causing eutrophication, the depletion of oxygen in water, which kills aquatic animals. Fine sediment is entering rivers; it may, for example, be run-off from quad bike tracks, ploughing of riverside pastures to grow crops, or sheep or cattle encroaching into rivers.

DIP IN FIGURES

Numbers of aquatic prey are falling in these degraded environments, and dipper populations are falling with them. A stretch of river that might have held four or five territories in the past, now holds one or two.

How do polluted water and a consequent reduction in the amount of prey play out in the life of a single dipper? Stuart Sharp of Lancaster University is leading research on rivers in the Yorkshire Dales to see how variation in water quality affects the lives of individual birds. "One aspect that we have been examining is how exposure to poor water quality in the nest affects a dipper's life further down the road. For example, studies of other species in captivity show that poor diet early in life affects the quality of song. Dippers sing all year round and are highly territorial, so a poor singer would be less likely to acquire a mate or defend a territory."

Over the coming weeks, dipper numbers in the lower reaches of rivers will thin out as winter migrants depart for the high fells. Freed from the encroachments of winter intruders, and able to reassert their full territorial boundaries, established pairs will be singing out, sounding rather like high-pitched thrushes, with a song that rises above the roar of the river. They'll be building their nests under waterfalls, on rocky banks or under bridges.

DIPPERS SING ALL YEAR ROUND AND ARE HIGHLY TERRITORIAL, SO A POOR SINGER WOULD BE LESS LIKELY TO ACQUIRE A MATE.

For photographer João Comes, who took the stunning pictures for this feature in central Portugal, a four-month intensive watch is about to begin, as he records the breeding season from makeshift hides.

After three weeks of being fed in the nest, fledglings take to the river like a duck to raging water. Their first attempts at hunting for themselves can be hilarious to our eyes. They may beat out a caddis nymph from its case, then discard the grub and eat the case. Nevertheless, within 20–30 days, they are almost as good at walking through water as their parents. No small feat.

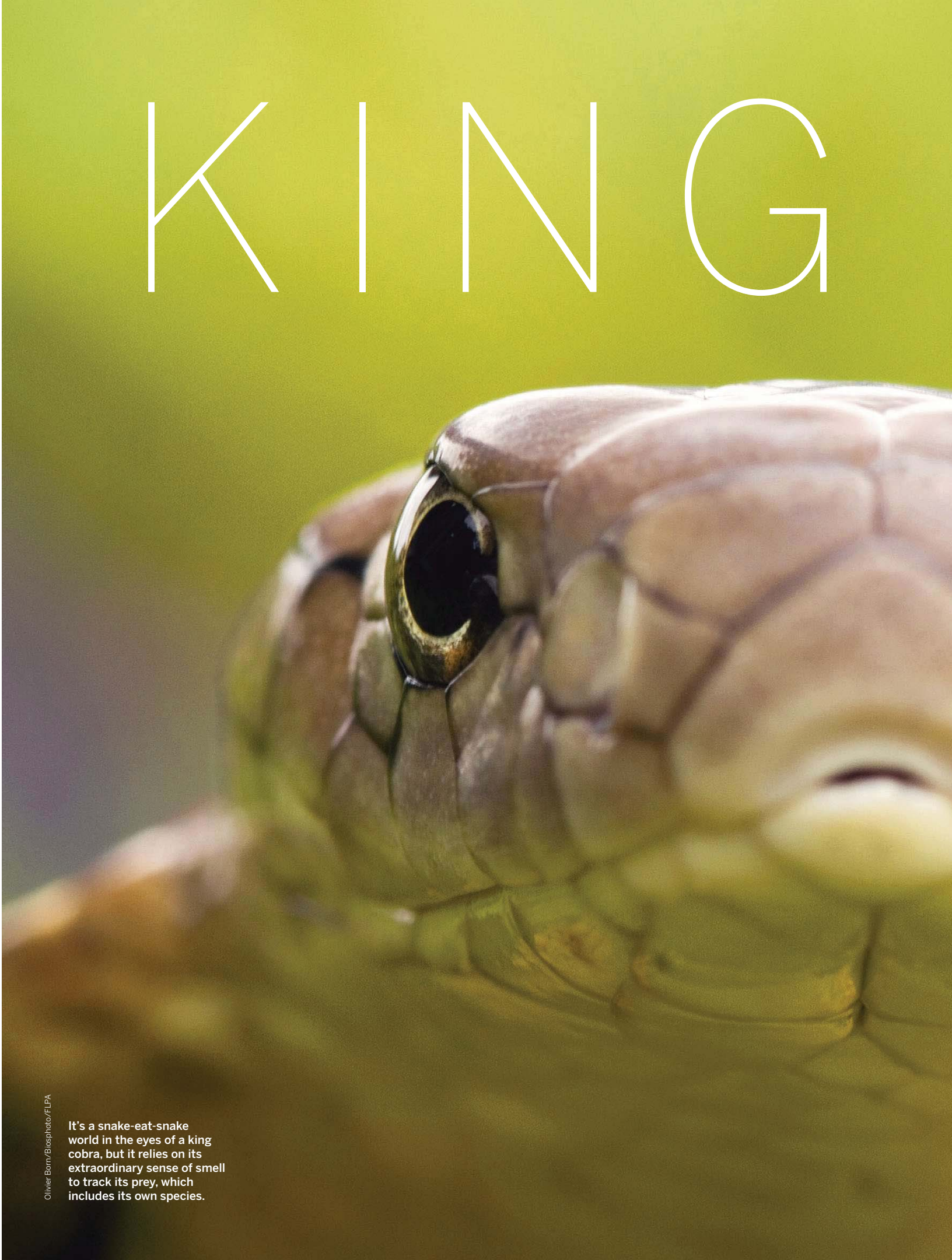
Those of us who will have the opportunity and pleasure of watching dippers this summer cannot fail to be captivated. Dip and blink, dip and blink.

FIND OUT MORE

Learn more about dippers, and hear their song, at: **www.bbc.co.uk/programmes/b03k6rrj**

DEREK NIEMANN *is a naturalist and author. His latest book* A Tale of Trees *(Short Books, £14.99) was reviewed in our November 2016 issue.*

KING



Olivier Born/Biosphoto/FLPA

It's a snake-eat-snake world in the eyes of a king cobra, but it relies on its extraordinary sense of smell to track its prey, which includes its own species.

OF SNAKES

A king cobra has other snakes for dinner and tracks prey better than a bloodhound, but that's not all researchers in Agumbe, India have discovered, writes **JANAKI LENIN**.

The dark king cobra crawled over wet, speckled tree roots. A 60cm-long Malabar pit viper made a break for it, but it was too late. The much larger, 3m-long snake caught up in an instant and grabbed it. Struggling to escape, the viper plunged its long retractable fangs into the cobra, which let go and sat as if stunned, getting drenched in the torrential rain. Without losing a moment, the viper made good its escape. It swam across a forest stream and lay still, blending among the tree roots.

As long as the pit viper didn't move, the king cobra couldn't spot it. The dazed predator stared blankly and he didn't flick his tongue. The pit viper had won a rare reprieve from this famed snake-eater – the world's longest species of venomous reptile that can measure up to 5.5m nose to tail (even longer specimens have been claimed).

Minutes later, however, the cobra came to and his tongue darted on the wet leaf litter. Following his prey's scent trail, he dived into the stream and searched ▶

The king cobra is a strong and rapid swimmer, and can also climb trees.

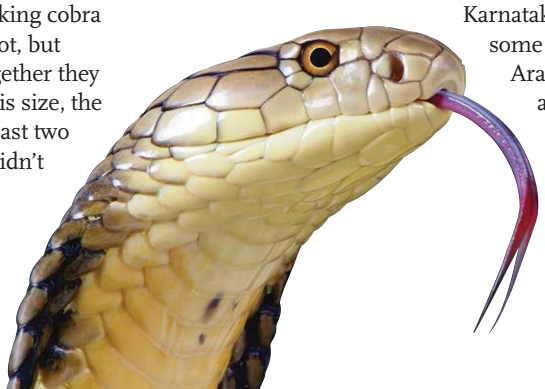
Swimming & courting: Sandesh Kadur/NPL (captive); grapple: Sandesh Kadur/NPL; researcher: Olivier Born/Biosphoto/FLPA; cutout: Matthijs Kuijpers/Biosphoto/ardea.com; charmer: Michael & Patricia Fogden/Minden/FLPA

underwater until he realised he was on the wrong track. Flicking his tongue on the water surface, he finally found the scent trail – a feat beyond dogs' capabilities. Even though the viper was visible close, the cobra trusted his keen sense of smell more than his sight. The predator was almost on top of his prey when it flinched and the game was up.

The king cobra clamped his jaws on his struggling prey and dragged it underwater. Holding his breath, he drowned his envenomated victim. When it went limp, he came ashore to swallow it. Throughout the 2008 monsoon, researchers at the Agumbe Rainforest Research Station in India's Western Ghats observed this king cobra eating 26 pit vipers over 140 days. It sounds a lot, but these serpentine noodles were so small that together they weighed no more than a single rat snake. For his size, the cobra needed to put away the equivalent of at least two rat snakes a month, nearly 30kg a year, yet he didn't seem to be suffering from the meagre diet.

King cobras have a wide range in South-east Asia and starred in BBC Two's recent epic *Thailand: Earth's Tropical Paradise*. They are virtually exclusive consumers of snakes – occasionally they eat monitor lizards, but make no further concessions to their diet. One was even observed peeling a road-killed Forsten's cat snake, which was buzzing with flies, off the tarmac before swallowing it.

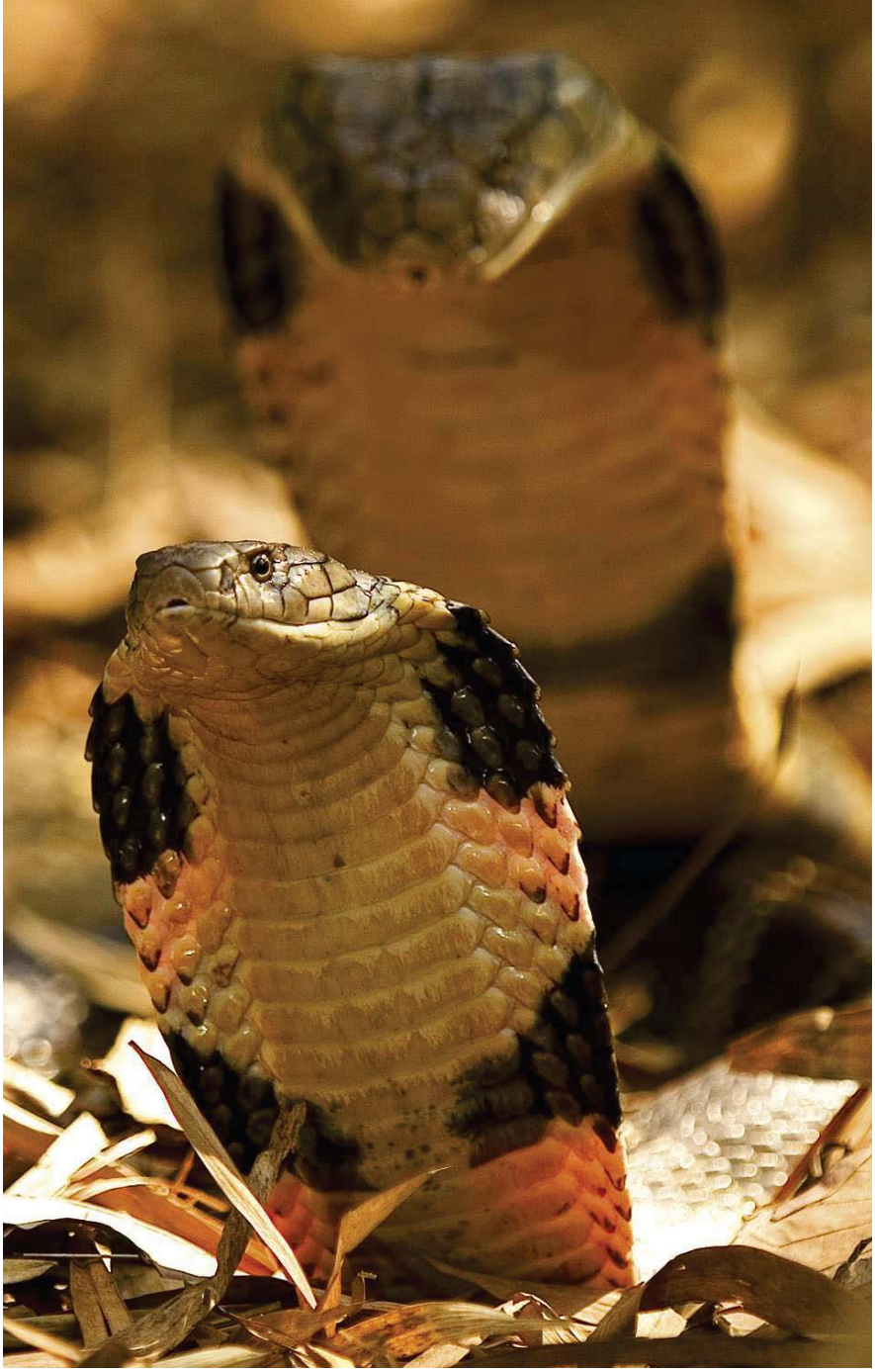
Below: a cobra uses its long tongue to detect prey. Above left: two males grapple and try to force each other to the ground. Above: a researcher measures a king cobra at Agumbe.



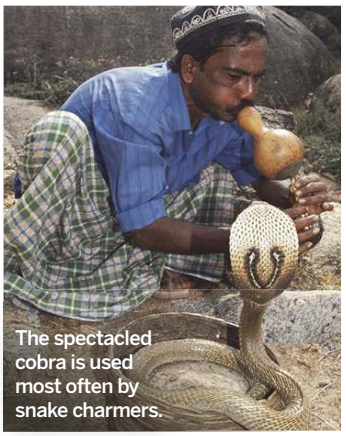
COLOUR CODING

The pit viper-eating habits of that king cobra surprised the researchers. They thought he would find a sheltered spot to wait out the rains and perhaps not eat much until the weather lifted. Agumbe, in the south Indian state of Karnataka, receives 7m of rainfall a year; in some years westerly winds blowing off the Arabian Sea dump as much as 11m. In an average monsoon rains don't let up for three months. The deluge cramps the activities of most mammals and birds, but reptiles and amphibians thrive.

Throughout most of the year, king cobras live a solitary existence within the confines of their home ranges.



MAKING A SPECTACLE



The spectacled cobra is used most often by snake charmers.

King cobras are widespread in forests, mangroves and farmlands along the Western Ghats, Himalayan foothills and eastern parts of India, lowland Nepal and South-east Asia, east to China's eastern coast, the Philippines and Indonesia, so are frequently encountered by people. Yet, although their venom is fatal to us – a single envenomation would be sufficient to kill 20 humans – it is the spectacled cobra that kills more people. Also known as the Indian cobra, the latter is used by snake charmers in India. It cannot hear the music but responds to the movements of the 'charmer'.

The pit viper-eater that the researchers were following had staked out a 15km² chunk of forest for himself, while another lived in 30km² of farmland, preferring larger meals of rat snakes and spectacled cobras. Within their domains each snake had its favoured hide-outs, such as termite mounds, canebrakes and burrows. They seemed to have a map of the local terrain in their heads, making for these spots to digest their meals, shed their skins or shelter for the night.

Although the ranges of king cobras often do overlap, they tend to avoid each other. In captivity keepers house king cobras separately because, given a chance, they will eat smaller members of their own species.

Come February, however, they prowl for sex in unfamiliar territory, throwing caution to the wind. This begs a question. How do they avoid eating rivals and potential mates – or being eaten by them? With such a dietary preference, a king cobra's social life can be fraught.

KING COBRAS ARE VIRTUALLY EXCLUSIVE CONSUMERS OF SNAKES – BUT OCCASIONALLY WILL EAT MONITOR LIZARDS.

Above: the female turns away and flashes her yellow chevron hood markings as part of an elaborate courtship ritual. Once they have mated, the pair may remain coiled together for an hour or more.

Evolution had a solution for this problem, however. King cobras in Agumbe change colour during the breeding season. The front half of males turns lighter so the yellow bands become indistinct. Females become darker, with their golden yellow bands standing out prominently. Perhaps this colour coding helps them recognise males from females, and females from prey. Another, more critical, adaptation deals with the potential for cannibalism directly. King cobras go off food during this period. The urge for sex suppresses their appetites.

Our pit viper-eater crawled 14km in search of a female. When he found her holed up in a burrow one evening, he didn't barge in. He slept outside in the open through the night. But the next morning, before he could make any overtures, another male showed up. The rivals engaged in a duel, testing which one was the better male. They coiled around each other and tried to slam the other down, performing a ritual combat dance.

Despite their arsenal of potent venom and vice-like jaws, the adversaries kept their mouths shut; the combat was a test to prove muscular strength and stamina. An hour later, the pit viper-eater conceded defeat and the victor chased him away. This was a typical encounter between two male king cobras.

FLIGHT OR BITE

Researchers at Agumbe observed extremes of behaviour. On one rare occasion, the victor and defeated got along famously after a wrestling bout, and mated with the same female. But king cobras can get their wires crossed to deadly effect: hormones don't always keep their mouths snapped shut. Once, before a weaker rival could give up and escape, his stronger 4m-long opponent killed and swallowed him. The fighting took place in a cowshed and, during the fierce battle, one of the snakes bit a buffalo calf. Within 20 minutes the young bovine lay dead. ▶

A UNIQUE NEST BUILDER

The king cobra is the only snake to build a nest, the female coiling her body to gather each load of leaf litter. The species is common in the oil palm plantations of Kalimantan, Indonesia, but since the only leaves lying on the ground are long, unwieldy palm fronds, female king cobras are challenged to build their nests there. They can't move the heavy fronds, nor are palm leaves appropriate material for building rainproof nests. Preliminary results of radio telemetry research indicate the animals may gorge on Sumatran cobras in the palm plantations but retreat to neighbouring mangrove areas to nest.

Clockwise from top: a hatchling at Agumbe climbs a tree past colourful cup fungi; the female lays 20–30 eggs in her nest, covers them with leaves and guards them for two or three months; king cobras inject smaller snakes with their venom and then swallow them whole.

Most combat between males happen in a female's presence but in this instance, except for a crowd of horrified people, there were none about. Perhaps the impulse to eliminate the competition overrode the desire to seek a mate. It was the only instance observed by researchers of a wild male king cobra cannibalising another male.

Once males win their mates they stay with them for many days, guarding them from rivals. One such pair holed up in a hollow under a tree buttress in a villager's yard. Then the male left thr female and set off. A couple of days later, the female went looking for him, following his trail with her tongue. When she caught up with him the pair stayed together for the next month. They emerged from the burrow and basked in the sun next to each other every day, often in full view of local human residents.

For years in Agumbe, spooked villagers called snake catchers to remove king cobras from their gardens and farms. After inserting a radio transmitter into the body cavity of one such cobra, the researchers released it more than 40km away from the capture site. For nine months, he roamed without direction, covering 83km – possibly a world record for snakes. Unlike the other two king cobras that lived in one area and frequented the same spots, this one kept crawling onward, not visiting a location again.

During his ceaseless wanderings, the cobra didn't pause to court and mate, nor did he feed adequately. Ten months later his radio transmitter failed and the researchers lost him. Although they tracked only one exiled cobra in this way, they began to discourage the practice of moving king cobras far from their home ranges, a decision backed up by research on displaced reptiles in other parts of the world that has shown that the animals take higher risks and often don't survive for long.

OCCASIONAL CANNIBAL

Instead, the cobra researchers offered to watch any snakes until they left villagers' gardens. So when they were called by the family in whose backyard the 'cosy' cobra couple had taken up residence, the snakes weren't marked or tracked by radio transmitters.

The snug scene of the king cobra couple was disrupted by an intruder: another male issued a challenge to the resident. The researchers couldn't identify the rivals for certain, as the two duked it out, but believed it was the intruder who won. The victor then approached the female, who was already heavy with eggs, and began courting her.

She responded by holding her head close to the ground, and spreading her hood to show off her yellow chevron marking. Coils of her body covered her head, flashing the bright yellow bands. This was typical female behaviour when a male king cobra shows interest.

In this case, though, the male abruptly switched from courtship to predation. He grabbed the female's neck in his strong jaws, crushing her windpipe. The smaller snake thrashed and struggled. Her body pulled backwards but the male's hold didn't slacken. She spun her body along its length the way crocodiles do to dismember their prey.

Unlike the cobra previously described, that seemed to be stunned by the venom of the lightweight pit viper, this female appeared to be immune to the venom of her own species. Although the male chewed his venom into her, it didn't seem to have immediate effect, and it took nearly an hour of frenzied fighting before she finally went limp.

The researchers were puzzled. Why did the male kill the female? Was it a case of mistaken identity? He knew she was a female king cobra all along because he started courting her. Did he kill her to destroy the other male's progeny? Killing a rival's offspring is mammalian behaviour rather than that of reptiles. Besides, killing a female in her prime doesn't seem like a reasonable reproductive strategy.

ONCE MALES WIN THEIR MATES THEY STAY WITH THEM FOR MANY DAYS, GUARDING THEM FROM RIVALS.

Above: the king cobra is likely to flee rather than attack a person, but as a warning display it rises up, extends its hood and emits a deep growl.

The breeding season was drawing to a close. Perhaps the hormones that make king cobras lose their appetites were on the wane and the male was ravenous. He attempted to swallow his prey, but when he reached her swollen belly, he regurgitated, left her carcass and crawled away. Had he been famished he would have swallowed her. Perhaps her girth was too much to handle?

This action echoed a similar case earlier in the breeding season when the female in question wasn't pregnant. Researchers don't yet know if such cannibals are repeat offenders, or whether specific circumstances trigger this behaviour. King cobras are not exceptional – they are one among more than 100 species of snakes known to be cannibals. But the painstaking observations carried out at Agumbe show just how much fascinating snake behaviour we have yet to unravel, even in relatively well-studied species such as the 'king of snakes'.

JANAKI LENIN
writes about wildlife and the environment and is based in India http://bit.ly/2jPSnOi.

FIND OUT MORE

BBC TWO

King cobras feature in BBC Two's series *Thailand: Earth's Topical Paradise*, available now at the BBC store. See: http://bbc.in/2jCwt1b

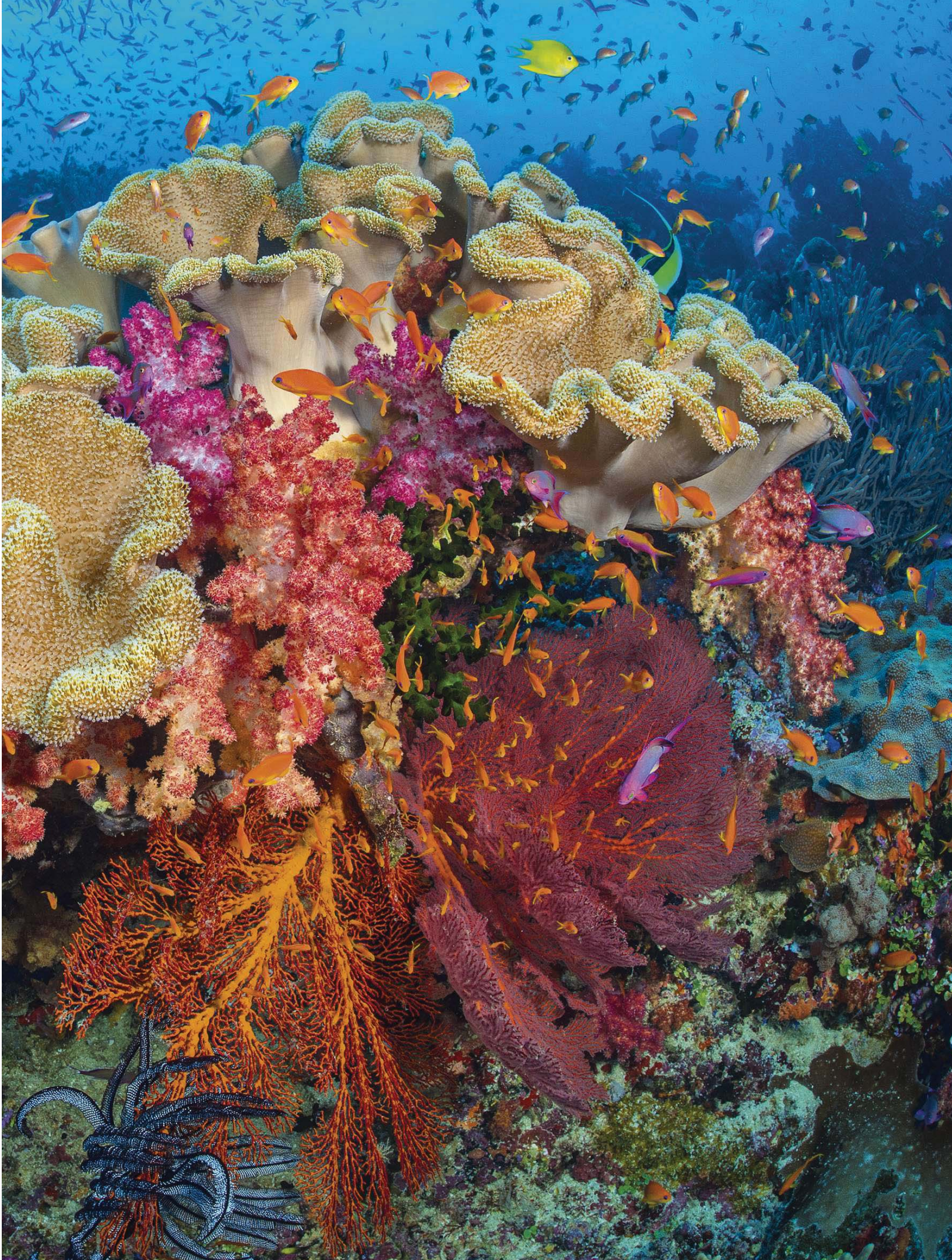
hatchling: Sandesh Kadur/NPL(captive); eggs: Malcolm Schuyl/FLPA; predation: Daniel Heuclin/NPL; display: Thomas Marent/Minden/FLPA

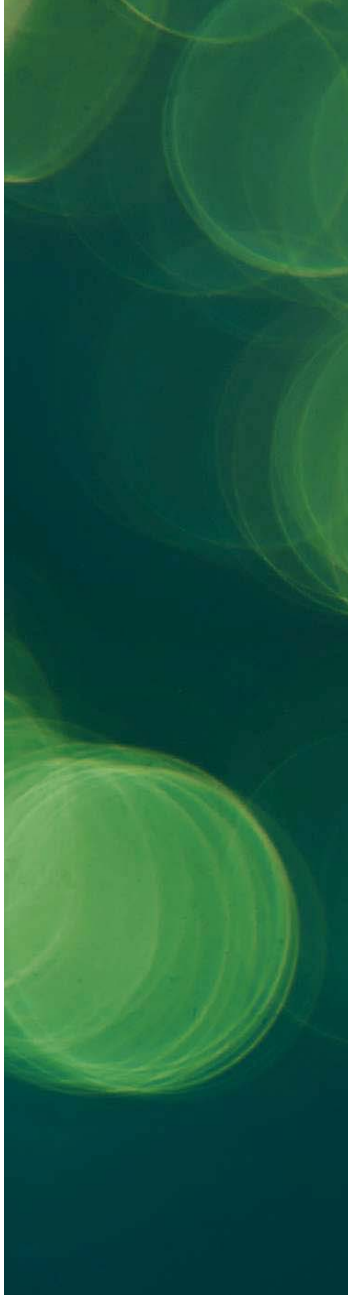
What lies beneath

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

BBC Wildlife PHOTO STORY

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.





ABOVE A yellow-lipped sea krait swims to the reef after surfacing for a breath of air in the Bohol Sea, Apo Island, 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.

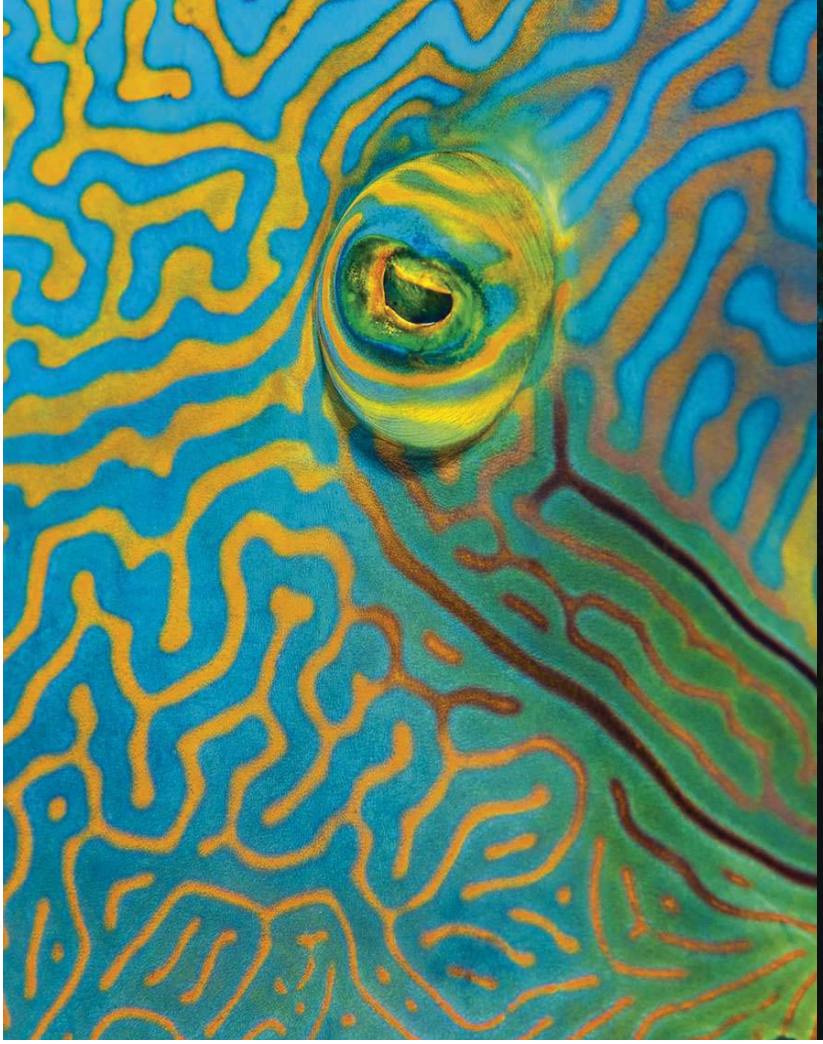
ABOVE A male scalefin anthias displays in open water at sunset in the Gulf of Aqaba, Red Sea, Egypt. The higher he dances during the courtship, the more likely he is to attract a mate.

LEFT A large colony of mountainous star coral spawn 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.

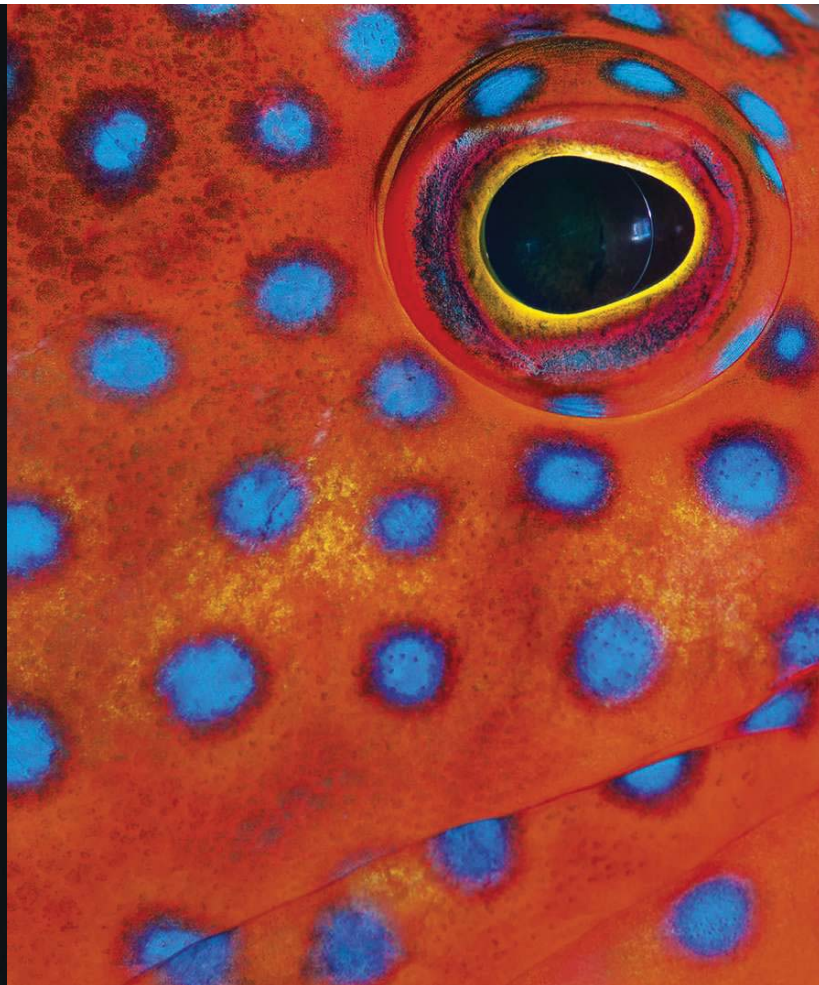
RIGHT The whip coral goby can be found, unsurprisingly, around whip corals. This image was taken in the Tropical West Pacific Ocean, Philippines. Gobies perch by creating a cup shape with their pelvic fins.

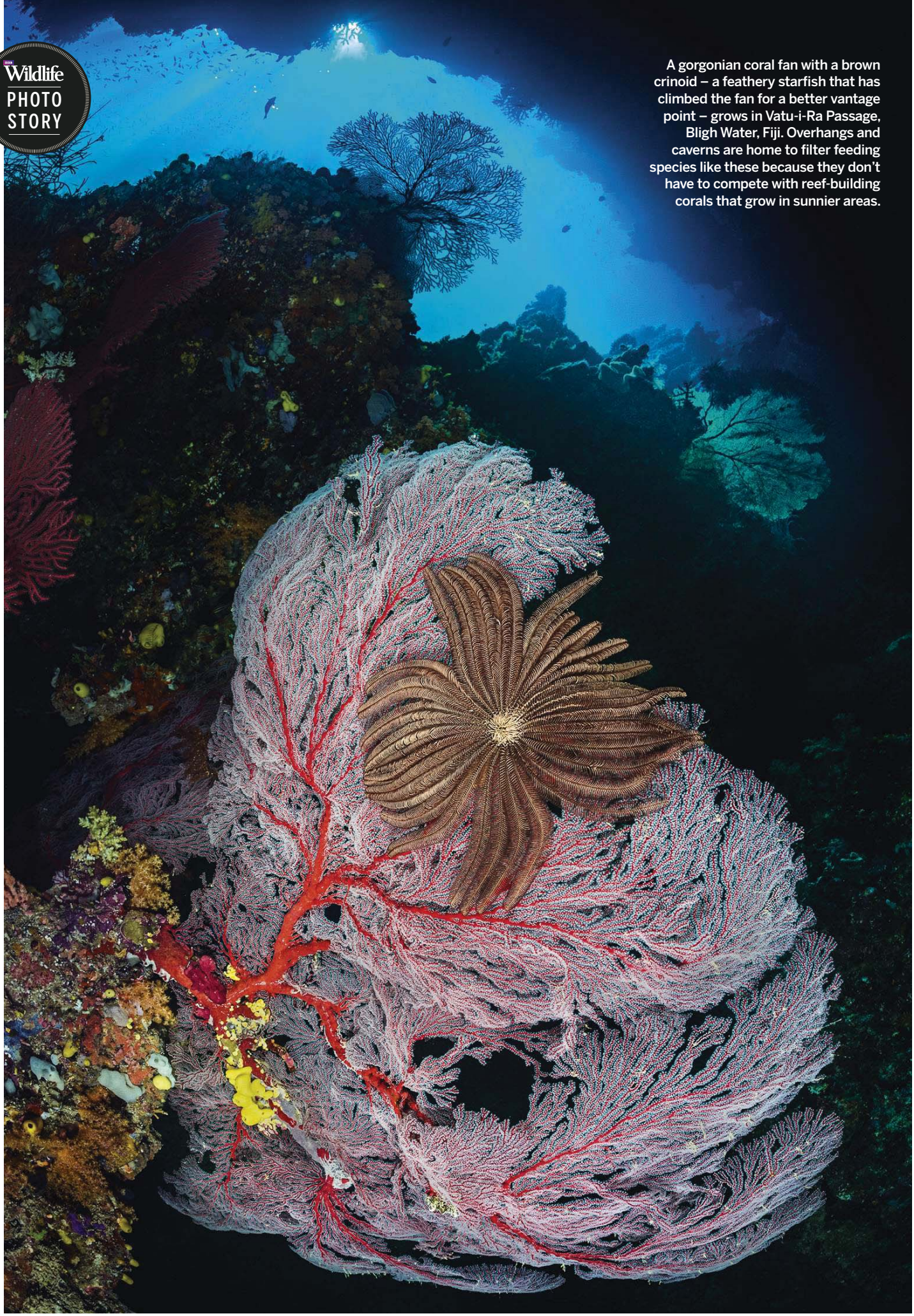
ABOVE A young golden damselfish hides amongst the branches of a red whip coral in Misool, Indonesia. The species shelters here for protection from predatory fish such as groupers, snappers and lionfish.

RIGHT 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.

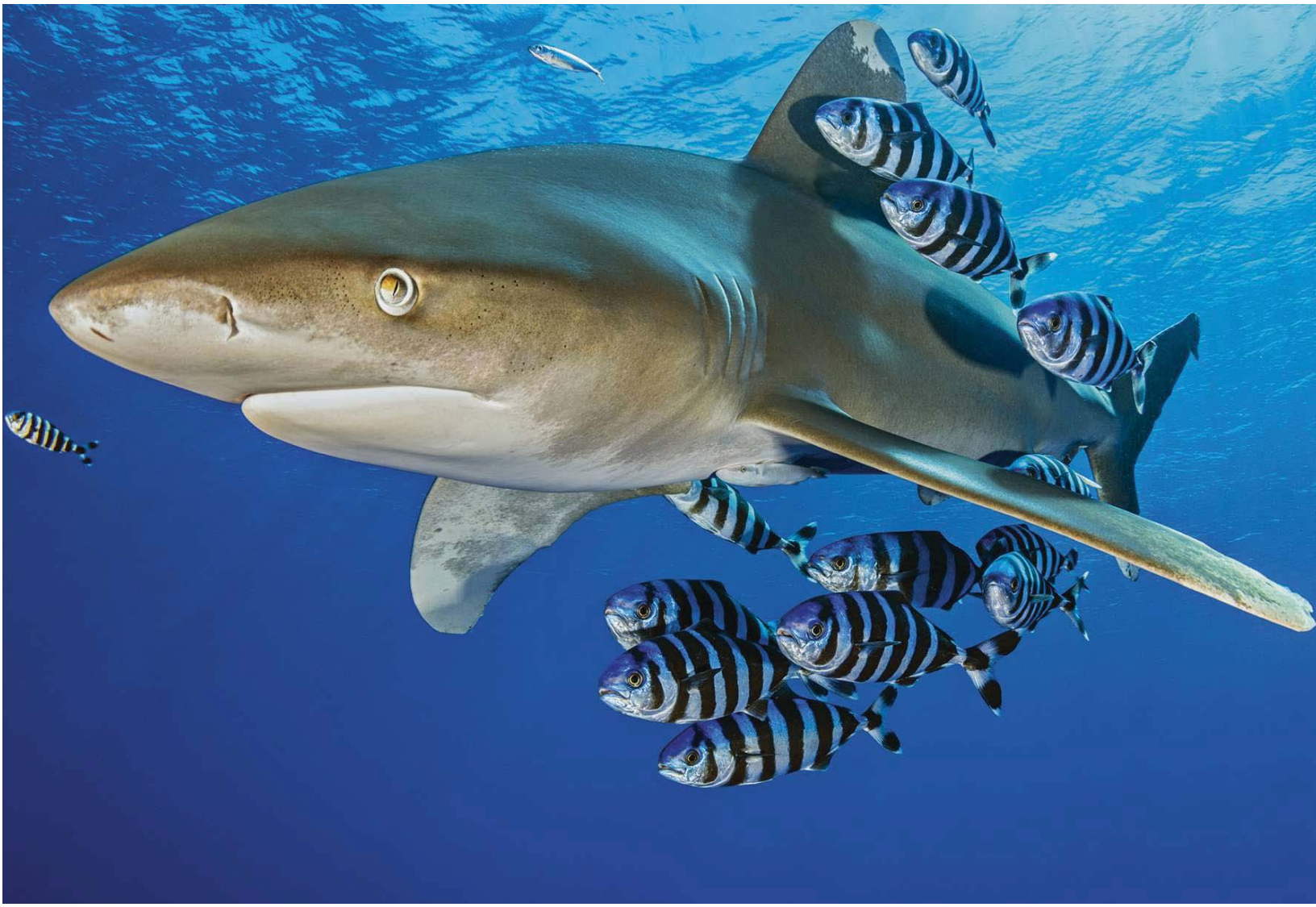


Numerous big fish such as the Napolean wrasse, Red Sea (**TOP LEFT**) and Nassau grouper, Tropical West Atlantic Ocean (**TOP RIGHT**) are good indicators of a healthy reef. The bright colours of reef species can warn others of the toxins in their skin (**BOTTOM LEFT**: variable neon slug, Molucca Sea) 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.



ABOVE 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.

RIGHT 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, £22.99). www.amustard.com*

REVIEWS

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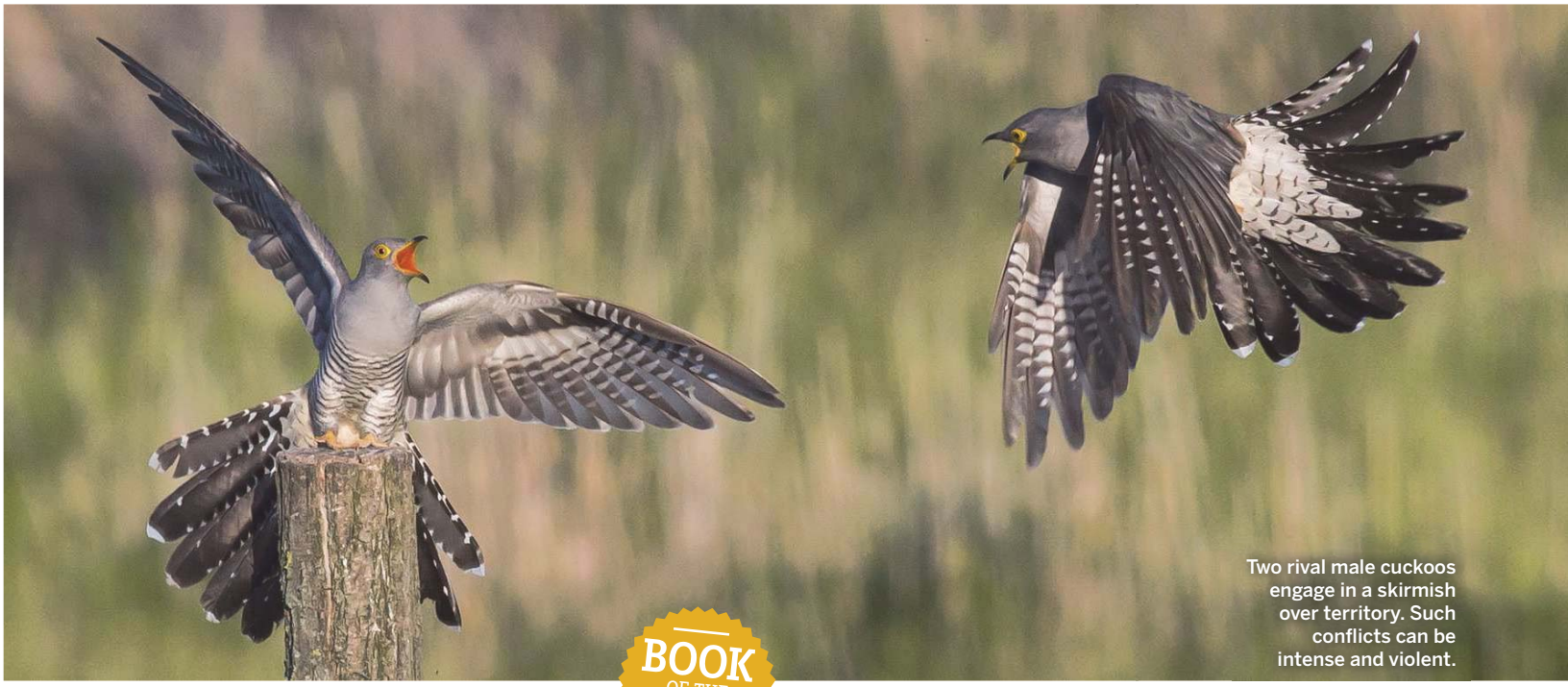


Two rival male cuckoos engage in a skirmish over territory. Such conflicts can be intense and violent.

BOOK OF THE MONTH

NATURE'S DECEPTORS

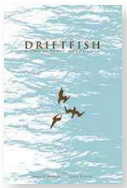
The story of the famous nest trespasser.

The Cuckoo: The Uninvited Guest

Oldrich Mikulica et al Wild Nature Press **£24.99**

It isn't often, even in these days of increasingly breathtaking photography, that a bird book comes along and leaves you speechless with admiration. For its outstanding images, text and overall design, this 'uninvited guest' is more than welcome. The photos, all taken by Oldrich Mikulica over several years, are of superb artistry and quality, and provide us with an intimate series of glimpses into the endlessly fascinating world of the common cuckoo. Researchers have discovered a great deal about the species' biology, but photographers, thanks to their unrivalled patience, often see and capture things overlooked or rarely seen by others. The images here – of the birds themselves, and their eggs, chicks and food – are presented in a wonderfully effective and comprehensive way. This isn't simply a picture book, however – the text has an accessible, engaging style, and is up to date, scholarly and eminently readable. My bird book of the year.

Tim Birkhead Ornithologist

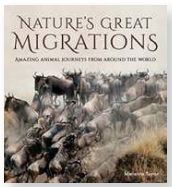


Driftfish

Edited by Susan Richardson and James Roberts Zoomorphic **£12.99**

A beautifully crafted anthology of essays, stories and poetry from online magazine *Zoomorphic,* this is a celebration of sealife in all its infinite forms by a long list of contemporary – but mostly unfamiliar – contributors. Unsurprisingly, whales are particularly well represented, with British writer Sarah Thomas skilfully capturing the guilty thrill of witnessing a whale hunt while hitchhiking in the Faroe Islands, and American explorer James Michael Dorsey relating an exhilarating encounter kayaking alongside a pod of hunting orcas.

Pete Dommett Nature writer

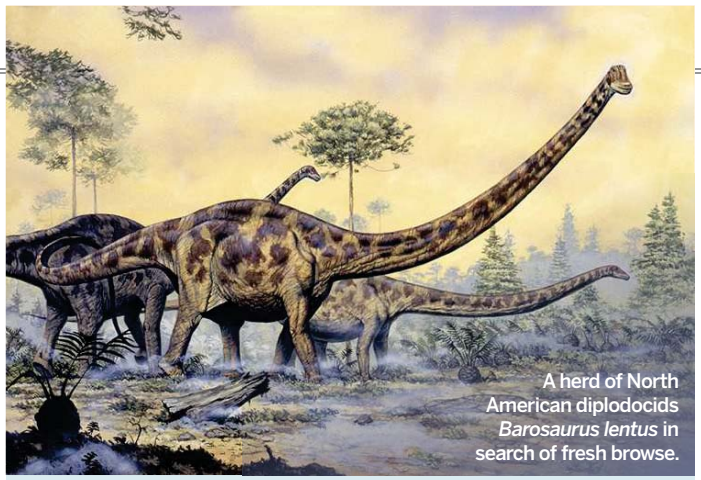


Nature's Great Migrations

By Marianne Taylor
New Holland **£16.99**

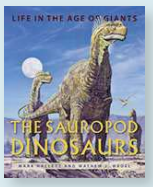
The epic journeys of migratory animals pose some of nature's most tantalising conundrums: where, why and how do some species travel many thousands of kilometres across or between hemispheres or oceans? Taylor tackles these head-scratchers for 25 wandering creatures – great and small – in a lively style that covers reproduction, feeding, conservation concerns and the mysteries of navigation. Some lacklustre maps and photos are minor weaknesses in an accessible introduction to a diverse crew of globetrotters.

Paul Bloomfield Travel writer



A herd of North American diplodocids *Barosaurus lentus* in search of fresh browse.

Cuckoos: Oldrich Mikulica; dinosaur illustration by Mark Hallett



The Sauropod Dinosaurs: Life in the Age of Giants

Mark Hallett, Mathew J Wedel
Johns Hopkins University Press **£26**

Size isn't everything – except when it comes to dinosaurs. The largest were the long-necked sauropods, of which *Diplodocus* is arguably the best-known example. Despite their bulk, these herbivorous giants have received less coverage than their scarier, carnivorous cousins, such as *Tyrannosaurus*, but this remarkable book helps to redress this imbalance. Blending hard evidence with informed speculation, it offers a complete guide to the science of the sauropods, from the history of their discovery and evolution to their biological basics. From this flows a plausible and readable reconstruction of lifestyle and behaviour, including how they might have moved, fed, socialised and interacted with the Mesozoic world around them. A must-have for any dinosaur enthusiast.

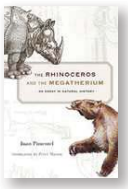
Paul Chambers Palaeontologist

Orchid: A Cultural History

By Jim Endersby
Kew Publishing **£22**

Few orchid books are as fascinating as this. Jim Endersby explores the grip of these exotic flowers on the human imagination, reflected in literature from antiquity to the present day. Their beauty has appealed to a gamut of emotions – romance, lust, avarice, jealousy – and no other plant family has become so deeply embedded in fiction and poetry. Melding art and science, this original title reminds us that the destruction of biodiversity also inflicts damage on our shared culture, a fundamental attribute of human existence.

Phil Gates Botanist



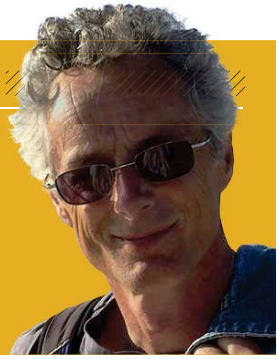
The Rhinoceros and the Megatherium

By Juan Pimentel
Harvard University Press **£22.95**

Scientific progress needs more than cold facts and rationality: it also requires a dose of imagination, according to Juan Pimentel. He argues that what we know about the giant ground sloth *Megatherium* (which now exists only as bones) and the Indian rhinoceros (which until 1515 was known only in the west from a few fantastical drawings) owes much to our delectation for a good story. No imagination would mean no theories of natural selection or relativity – indeed no interesting questions at all.

Stuart Blackman Science writer

MEET THE AUTHOR



Nigel Hicks

After a career photographing the far-flung, Nigel is now focussing his lens on the local.

What's special about the south-west?
For a remarkably small area, it has a hugely varied environment. Unlike most of England, population and industrial pressures in the south-west are relatively light, so there is still a significant amount of open space. And the region did not suffer the same level of environmental damage as the rest of the country during the 1960s–80s, so it's something of a wildlife reservoir.

Which part are you most fond of?
The 'toe' of land between Penzance and Land's End. I grew up here and the rugged remoteness still appeals.

Can you suggest three unmissable locations?
First, the Isles of Scilly. The quality of the light, the colours of the water and the curves of the sandy bays and rocky islets are stunning. Second, the Avalon Marshes of the Somerset Levels. The flooded remains of former peat-extraction sites, these are a mix of open water, reed-lined marshes, boggy woodland and seasonally flooded grasslands, and give a sense of what much of the Levels must have been like before they were drained hundreds of years ago. Third, Cornwall's Atlantic coast, for the sheer raw power of the ocean.

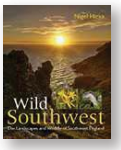
What wildlife rarities are found in the south-west?
There's the Eurasian bittern, European spoonbill and great white egret, all of which have started to recolonise parts of the UK after long absences. In the sea, the westernmost coasts see basking sharks regularly, along with the occasional leatherback turtle and sunfish.

> "THE REGION IS SOMETHING OF A WILDLIFE RESERVOIR."

Any memorable wildlife encounters?
I once came across a newborn seal pup making its way down to the sea. Its beautifully cute face did not match the very threatening snarl it gave as I approached.

Did any species elude you while writing the book?
Kingfisher and roe deer! Both will get priority treatment in my next project.

Where are the best places to escape the crowds?
Just about anywhere if you venture more than 200 yards from any rural or coastal car park. Just start walking and you'll soon leave almost everyone behind.



● **WILD SOUTHWEST** *offers an overview of the landscapes and wildlife of Devon, Cornwall, Somerset and Dorset (Aquaterra Publishing, £14.99)* **www.aquaterrapublishing.co.uk**

Frank and Benedict with Kandengi villagers, Papua New Guinea.

Main: David Osborne/Tigress Productions/BBC; inset: Tim Laman/National Geographic Creative/NPL

The King of Saxony bird of paradise was among Frank's must-sees.

TV CHOICE

IN SEARCH OF PARADISE

One man's mission to see his ultimate birds in the wild.

Birds of Paradise: The Ultimate Quest
TV BBC Two
Catch up on iPlayer

In 2004, BBC security correspondent Frank Gardner was reporting from Saudi Arabia when he was shot by Al-Qaeda terrorists and left for dead. He escaped with his life, but never regained the use of his legs.

To describe him as 'confined' to a wheelchair is to use the word in its loosest sense. This is a man whose sense of adventure did not leave him when his ability to walk did. He skis, quad-bikes and snorkels, and continues to travel extensively, even venturing into Rwanda's Virunga Mountains – carried by former poachers on a rattan stretcher – to see mountain gorillas.

Now, Frank is embarking on another trip, and this time it's a big one: a quest to the remote heart of Papua New Guinea to fulfill his lifelong dream of observing birds of paradise in the wild. Accompanying him is explorer Benedict Allen, on his own mission to reunite with the Niowra people that 'adopted' him 30 years ago. The journeys of the two men – both physical and emotional – are followed in this new series.

Frank has long been a keen birder, with a current tally of 1,398 species. "Birds of paradise are the holy grail," he says. I've always yearned to see them. Not just for their beauty and extraordinary courtship rituals, but also for how they've evolved. They have no predators (except man) on Papua New Guinea; the island is literally paradise for them."

> "BIRDS OF PARADISE ARE THE HOLY GRAIL. I'VE ALWAYS YEARNED TO SEE THEM.

But the path to paradise does not run smooth. To access the species' prime territory among the high, forested slopes of the Central Range, Frank must surmount jungle, swamp, river and ravine. The solution – for part of the way at least – is a type of sedan chair, but it's a risky mode of transport: his injuries are complicated, and even the most minor misstep could have severe consequences. "I had to have absolute trust," he recalls. "If anyone slipped I could have broken my neck."

Whether Frank finds his beloved birds I can't possibly say, but this is life-affirming stuff. It's about celebrating what you have – and what our planet still has. "Every day is a bonus," says Frank. "Life has been given back to me." And with that in mind, his eyes are now cast south towards Antarctica... **Sarah McPherson**

DON'T MISS OUT!
Catch up with any TV and radio programmes that you've missed at **www.bbc.co.uk/iplayer**

Q&A

Frank Gardner

When did you first learn about birds of paradise?
I was eight years old. I had a set of playing cards with the birds on the back. I asked my mother if they actually existed, and she said "yes, in Papua New Guinea". From that day I've always wanted to go there.

How tough was the whole experience?
I was pretty uncomfortable a lot of the time. It was hot and humid, and the food was appalling. It was also muddy, which made it difficult for me to get around. But I got to see this extraordinary, remote part of the world and witness tribal practices that few have seen. The Niowra performed a welcome-back ceremony for Benedict, and their costumes and displays were amazing.

Did you get a sense of how vulnerable the birds are?
Very much so. A road is being built in the Highlands, and while this will mean great progress for the local people, it is cutting through the birds' territory and habitat. In terms of wildlife it's a real worry.

Is there a strong conservation movement?
No, and there's a real need for one. The mountains limit building, but the country is developing rapidly.

Do the locals see the birds as worth protecting?
Some do, but for most they remain a means of decoration and food. But they don't take enough to destroy populations. Roads and habitat loss are far more damaging.

FRANK GARDNER *is a broadcast journalist and author.*

DINOS CENTRE STAGE

So You Think You Know About Dinosaurs?

LIVE SHOW
Various UK venues in February and March

Kids love dinosaurs – in fact we all love dinosaurs. And now palaeontologist, TV presenter and *BBC Wildlife* contributor Ben Garrod, who graced our screens alongside Sir David in *Attenborough and the Giant Dinosaur,* is appearing on stage in theatres country-wide to present a new, interactive dinosaur show.

The production is aimed at families, with audience participation high on the agenda – Ben will be inviting people in the audience to shout out what they know, and to challenge him with their own questions. His talks will be illustrated with footage from the BBC Two series *Planet Dinosaur*, which aired in 2011, as well as images from his own digs. "We have all at some point had a fascination with dinosaurs," he says. "I want to give families the chance to take everything they thought they knew about these ancient animals and discover the truth. We'll be using the most up-to-date science to give as many amazing facts as we can."

● *For information on tour dates visit* ***http://bit.ly/2jwYuY6***

Ben: The Forum, Norwich; Steve: David Bain/BBC

WILD WATERS

Down the Mighty River with Steve Backshall

TV BBC Two
Due to air late February, see *Radio Times* for details

Also heading to New Guinea this month is Steve Backshall, the popular presenter who has inspired thousands of children to take an interest in wildlife.

No stranger to adventure, the unstoppable naturalist is now taking on the Beliem River in Papua (the Indonesian half of the New Guinea), putting into practice the kayaking skills he has been honing since the age of 12. No one has attempted to travel this remote river from source to sea before – take one look at the jagged limestone rocks towering either side and the swirling, thundering currents, and it's blindingly obvious why. Predictably, the river proves unpaddleable at many a bend, and the team frequently call in a chopper to hop them over these treacherous stretches.

This series is mostly about the thrill of the kayaking, but also reveals a great sense of last remaining wilderness, as the team venture into unexplored caves, navigate thick jungle and meet the local Papuans living in isolated settlements along the waterway. Backshall's love of all things natural is apparent, with wildlife encounters including echolocating cave swiftlets, a water dragon, superb bird-of-paradise, giant flying foxes and, as he enters the tidal reaches of the river and completes his 500km journey, the remains of a giant saltwater crocodile.

Steve navigates the white water of the Beliem River.

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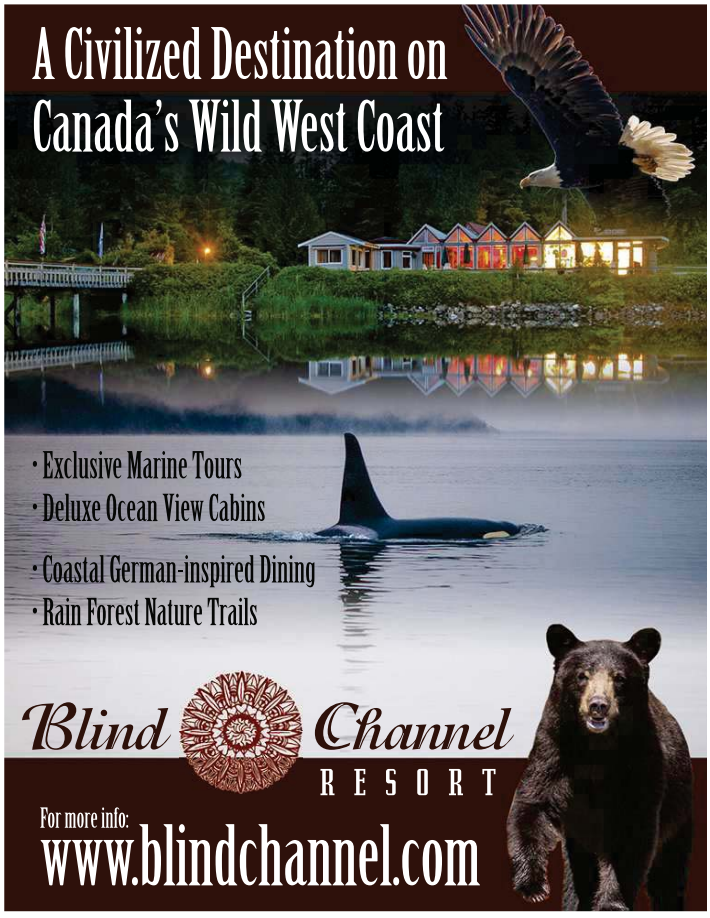

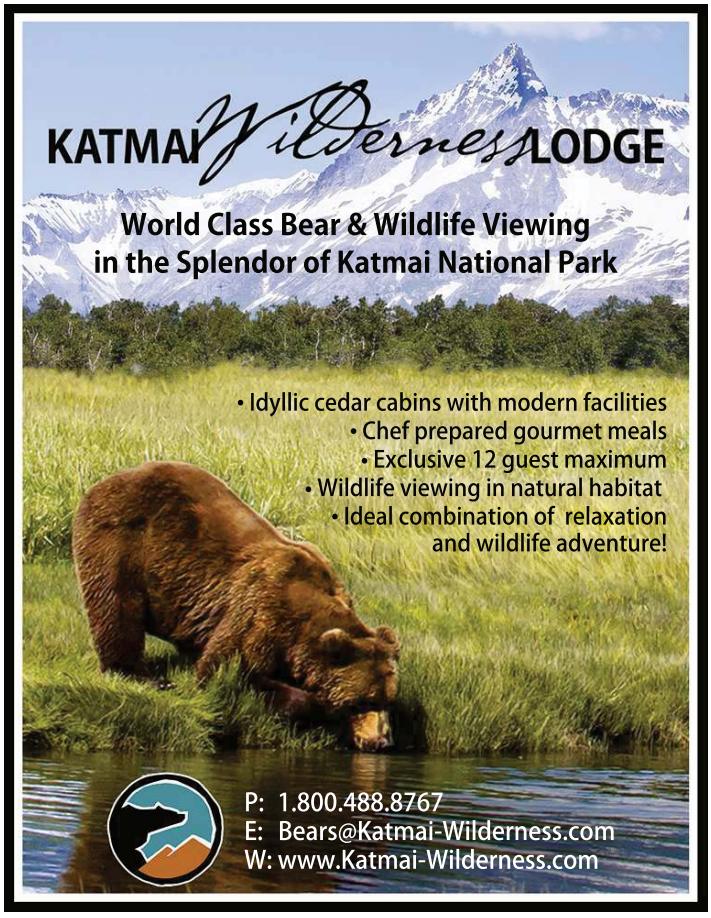

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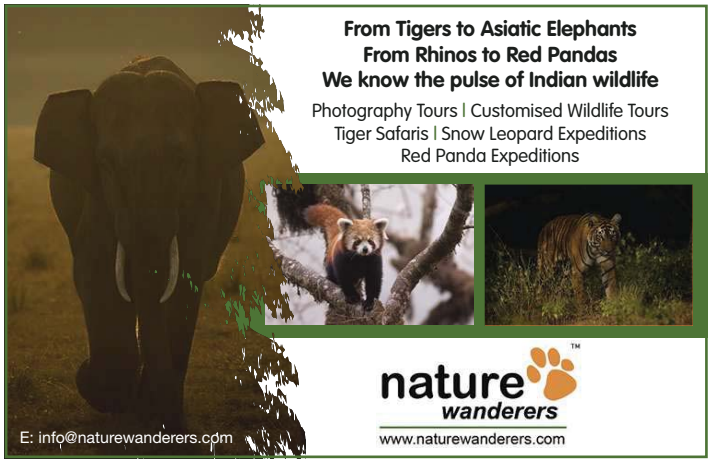

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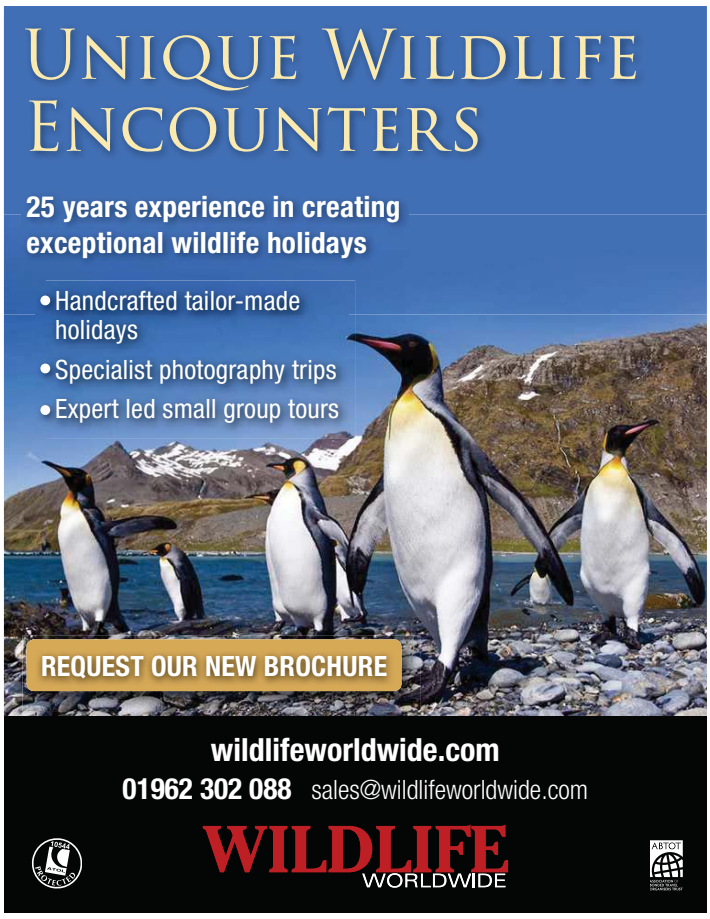

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Q&A

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OUR EXPERTS

STUART BLACKMAN is a science writer who is mildly obsessed with evolution.

KATE JONES is an ecologist and former chair of the Bat Conservation Trust (BCT).

BEN GARROD is an evolutionary biologist who specialises in both primates and skeletons.

MIKE TOMS is an author and associate director at the British Trust for Ornithology (BTO).

SARAH MCPHERSON edits the monthly Q&A pages. Send her your questions.

Q BIOLOGY

How do burrowing desert animals not inhale sand?

Sandfish are so called thanks to their ability to 'swim' though sand.

A There's plenty of air in the tiny spaces between grains of sand; the problem for sand-burrowing animals is how to get that air into their lungs while keeping the sand out. Narrow nostrils help, but other clever adaptations are also needed. The Colorado Desert fringe-toed lizard, for instance, is equipped with a respiratory U-bend that traps sand before it can reach the lungs, while the sandfish, a burrowing skink from North Africa and the Middle East, has a particularly wide section of respiratory tract. This slows down the stream of inhaled air, allowing any sand particles to fall onto a layer of sticky mucous, which is then coughed up, keeping the lungs entirely sand-free.

Stuart Blackman

EMAIL YOUR QUESTIONS TO

wildquestions@immediate.co.uk

or post to Q&A, *BBC Wildlife Magazine*, Immediate Media Company, 2nd Floor, Tower House, Fairfax Street, Bristol BS1 3BN

Q MAMMALS

Do bats use song for courtship?

A Male bats do sing to woo potential mates, but unlike most birds they can also use sound to navigate and hunt food. In fact, bats use noise for many types of communication – for example, distress calls, chittering within a roost, and pups calling for their mothers. Social calls tend to be much lower in frequency than the ultrasonic 'tweets' of echolocation calls. In some species calls are even low enough for humans to hear. Social calls also tend to be more complicated, sounding like a series of undulating trills that are quite beautiful to hear.

In the UK the most common time to hear bat social calls is in early autumn when bats start mating and preparing for winter. One West African species, the hammer-headed fruit bat (*Hypsignathus monstrosus*), has some of the loudest bat courtship calls, where males gather in groups or 'leks' and use their huge noses and voice boxes to produce deafening honking sounds to attract the ladies.

Kate Jones

Hammer-headed fruit bats gather in their hundreds to find a mate.

Q BIOLOGY

Do any animals' skeletons change as they age?

A Yes. Scientists have recently discovered that the European eel literally loses its skeletal framework during its lifetime, demonstrating an unparalleled morphological change. As an individual ages, specialised bone-resorbing cells known as osteoclasts gradually break down its skeletal tissue. Mechanical stability is maintained by the retention of an accelular notochord (a cartilaginous rod usually found in embryonic skeletons). This enables the structure of the eel's body to remain intact while the mineralised bone is converted into energy. This injection of strength is vital for the staggering 5,000km migration that the species undertakes from the fresh waters of its European home, through the North Atlantic Ocean, all the way to the Sargasso Sea. So, a skeleton isn't always for life. **Ben Garrod**

Sandfish: Chris Mattison/FLPA; bat: Kenneth W Fink/ardea.com; eel: Solvin Zankl/naturepl.com; yellowhammer: Daniele Occhiato/Minden/FLPA

Q BIRDS

Why does the UK have yellow birds?

A Plumage coloration is shaped by a suite of factors including sexual selection, predation risk and diet. Bright colours, such as yellows, that are seen in many species, are often associated with males and attributed to sexual selection, indicating quality as a mate. Interestingly, most evolutionary transitions in plumage coloration have tended towards increasing similarity across the two sexes, driven by natural selection. Research carried out in North America suggests that certain ecological conditions, often coupled with particular types of mating system, favour more brightly coloured males because of increased competition for mates. These conditions may not apply as readily here in the UK, so we have fewer brightly coloured species. However, it is difficult to untangle the influence of other factors, such as predation risk or the availability of carotenoid-rich foods, which allow the development of bright yellow pigments.

Mike Toms

Male yellowhammers are usually spotted singing from the tops of trees or bushes.

Crab: Cristian Umili/WWPics/Alamy; sloth: Kevin Elsby/FLPA; moth: Piotr Naskrecki/Minden/Getty; gulls: Terry Whittaker/2020VISION/NPL

WHAT IS IT?

Meet the crab that loves coral.

This long-limbed, golden-locked creature should surely be brachiating its way through the canopy of the Sumatran jungle. But this is an orangutan in name only. It's an orangutan crab, an inhabitant of the coral reefs of the Indo-Pacific. It is commonly found in association with another enigmatic species, the bubble coral, which inflates its grape-like polyps during the day. This exposes a greater surface area to the sun's rays to nourish the symbiotic algae that live within its tissues. It extends its stinging tentacles to feed at night. The crab-coral relationship may be symbiotic, too, or perhaps the crab just steals food ensnared by its host – no one really knows for sure. **Stuart Blackman**

Sloths provide food and a home for moths (*inset*), but are not hosts in the parasitic sense.

INSECTS

Are any butterflies parasites?

A No butterflies have truly parasitic life histories. However, contrary to the received wisdom that all caterpillars eat leaves, some species are predatory. Larvae of the large blue are collected by ants and taken back to the subterranean nest where the guests provide protein-rich secretions from 'honey-glands' on their backs. In return, the caterpillars gorge on grubs in the brood chamber. Such behaviour might be termed nest parasitism. *Calyptra* is a Eurasian genus of moth, the adults of which puncture skin and drink mammalian blood, but this is more analogous to a mosquito than a flea. And sloths harbour moths in their dense fur, but these do not feed on their hosts, instead feeding on the dung produced when the sloths descend the trees to defecate. Parasitism occurs in many insect orders and has evolved independently each time. Given a few more hundreds of millions of years, things might yet change for butterflies. **Richard Jones** *Entomologist*

BIRDS

Gulls squabble over pickings at a landfill site in Pitsea, Essex.

Is it food or nest sites that attracts 'seagulls' to cities?

A It's probably a bit of both. Gulls – especially herring and lesser black-backed – have been colonising our towns and cities since the 1940s. For some they are welcome visitors; to many, however, they are troublesome pests. The shift from burning to depositing waste in landfill has provided the birds with new scavenging opportunities, while rooftop nests are often less vulnerable to foxes and other predators. Either way the result is mess, noise and even aggression towards people and pets. A recent study showed most gull-human conflict occurs around foraging rather than nesting activity, which suggests that restricting food sources is a better way of reducing conflict than disrupting nesting. **SB**

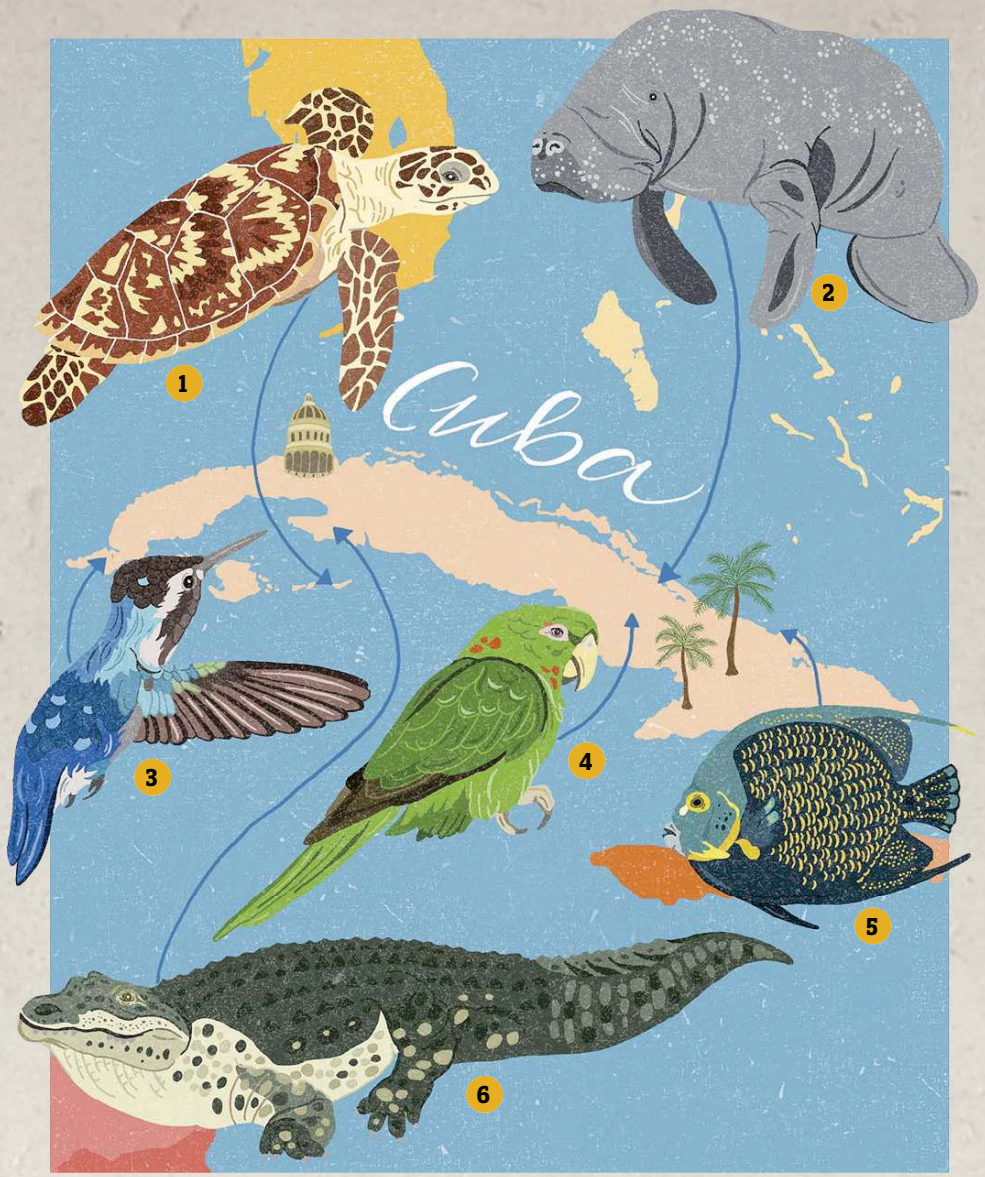

Illustration by Dawn Cooper; volunteer: FoTF

WHAT CAN I SEE IN...

Cuba

Visit this vibrant island to see over 20 endemic bird species, explore a swampy wilderness and dive on magical offshore reefs.

1 HAWKSBILL TURTLE
Cayo Largo del Sur
Hawksbills arrive at Cayo Largo to lay their eggs between April and September. There is a turtle conservation project here whereby eggs are taken and hatched, giving hatchlings a better chance of survival when they are released.

2 ANTILLEAN MANATEE
Humedal Río Máximo-Cagüey
The same species (but separate subspecies) to that found in Florida, the Antillean manatee does well in this protected area of mangroves and swamp evergreen forests.

3 BEE HUMMINGBIRD
Guanahacabibes Peninsula
You can't visit Cuba and not see the world's smallest bird. The bee hummingbird weighs in at about 2g, which is less than a sugar lump.

4 CUBAN PARAKEET
Finca La Belén, Camagüey
South of the town of Najasa, on poor roads, Finca La Belén is both a working ranch and a government-run hotel. You can see plenty of endemic bird species here, such as giant kingbirds and Cuban parakeets.

5 FRENCH ANGELFISH
Playa Pesquero
Renowned as one of the best snorkelling sites in Cuba, Playa Pesquero is a good location to see a huge variety of reef fish, including the beautiful French angelfish.

6 CUBAN CROCODILE
Zapata Peninsula
Zapata National Park is important for its extensive wetlands that provide the best habitat in Cuba for this endemic crocodile.

VOLUNTEERING

HOW CAN I HELP...

FRIENDS OF THETFORD FOREST

What does FoTF do?
We work in partnership with the Forestry Commission to help everyone access and enjoy Thetford Forest, which straddles north Suffolk and south Norfolk.

What sort of work do your volunteers get involved with?
Our volunteers look after Lynford Arboretum, check walking trails, meet and greet, undertake archaeological research and carry out conservation tasks.

How does their work directly help wildlife?
In various ways! Just some of our recent conservation tasks have included constructing and maintaining bird and bat boxes, improving habitat through clearance work, carrying out local pool-frog reintroductions, building a toad fence at a road crossing point, caring for our Goshawk Trail and making tern rafts.

How much time do you request from volunteers?
People can give as much time as they wish. The usual for conservation volunteers is five hours on the third Sunday in the month, though the Lynford group meets more often.

What's a recent achievement?
In 2016 we constructed four new tern rafts for Lynford Water. Other species are using the rafts as perches while we wait for nesting activity.

Any qualifications needed?
No. Training is given by Forestry Commission staff.

● Dave Goodrum **www.fotf.org.uk**

A volunteer clears a pingo – a type of rare pond found across the Norfolk landscape.

NATIONAL NESTBOX WEEK

14 - 21 February

Help promote the biodiversity and conservation of British birds by getting involved in National Nest Box Week. Anyone can contribute to the wildlife effort in their local area by putting up nest boxes. The added benefit being the joy of watching the breeding birds that you attract to your garden.

GARDENATURE

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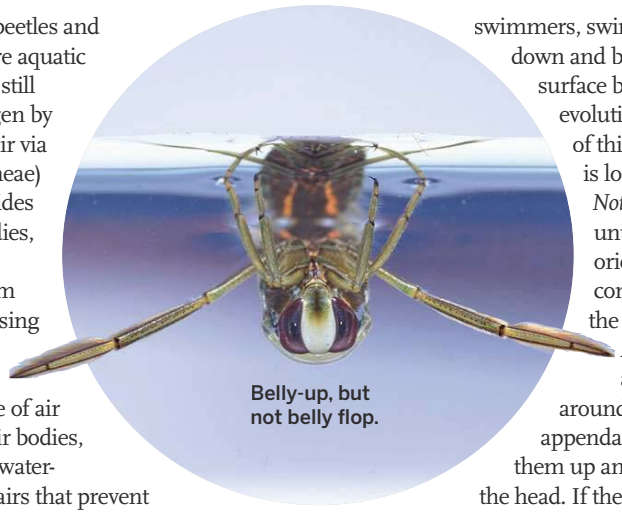
INSECTS

Why do water boatmen swim upside-down?

A Water beetles and boatmen are aquatic insects, yet still obtain oxygen by breathing air via holes (tracheae) along the sides of their bodies, rather than directly from the water using gills. They maintain a slim bubble of air against their bodies, trapped by water-repelling hairs that prevent saturation. This bubble, called the plastron, is replenished each time the insects come up for air. Oddly, while beetles and lesser water boatmen generally break the surface back-first, true water boatmen (*Notonecta*), also called back-swimmers, swim upside-down and break the surface belly-up. The evolutionary origin of this difference is lost, but in *Notonecta* this unusual orientation is controlled by the antennae. A bubble of air trapped around these appendages bends them up and away from the head. If the insect becomes inverted the bubble pulls the antennae towards the head, which the insect detects and 'rights' itself. If the bubble is moved experimentally, with a fine needle, the back-swimmer can be tricked into front-swimming. **RJ**

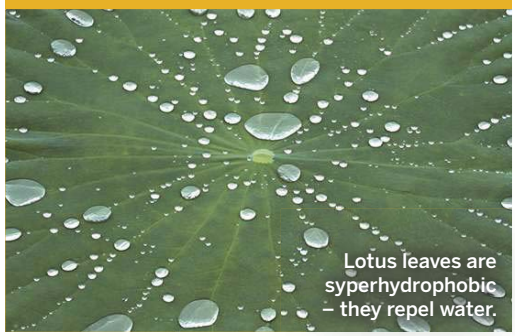


Belly-up, but not belly flop.

BOTANY

What is the lotus effect?

A This refers to the self-cleaning properties of the lotus plant (and other tropical species). The surface of a lotus leaf is covered in tiny protrusions. Under a microscope it's rather like a mountainscape of evenly sized, evenly spaced peaks. When water makes contact with a lotus it does so only via the very tips of these protrusions. The adhesive force between liquid and leaf is thus vastly reduced, forcing the water to form into balls and roll off. As it goes it collects and removes particles of dirt. There is a range of applications in the synthetic world that mimic the lotus effect, from windscreen glass to waterproof clothing. **Sarah McPherson**



Lotus leaves are syperhydrophobic – they repel water.

BIRDS

Do grey herons always nest near water?

A Grey herons in the UK prefer to nest in tall trees, typically located in areas that are free from disturbance and offer commanding views over the local landscape. While some heronries may be close to water, including those associated with estuaries and cliff-face sites, others are located further away, leaving the herons to make commuting flights of several kilometres to and from favoured feeding locations. The birds also use wet meadows and damp grasslands as 'standing grounds' – places to rest and digest their food. A dozen or more individuals may congregate at such sites, using them throughout the year.

Grey herons breeding in the Camargue regularly nest in the reedbeds adjoining the waterbodies within which the birds feed, but this behaviour is rare here. **Mike Toms**

Herons return to their nest sites in February; eggs hatch between March and April.

Water boatman: Kim Taylor/naturepl.com (captive); lotus: Tetsuya Tanooka/Afflo/Getty; heron: Laurent Geslin/naturepl.com

YOUR FEEDBACK

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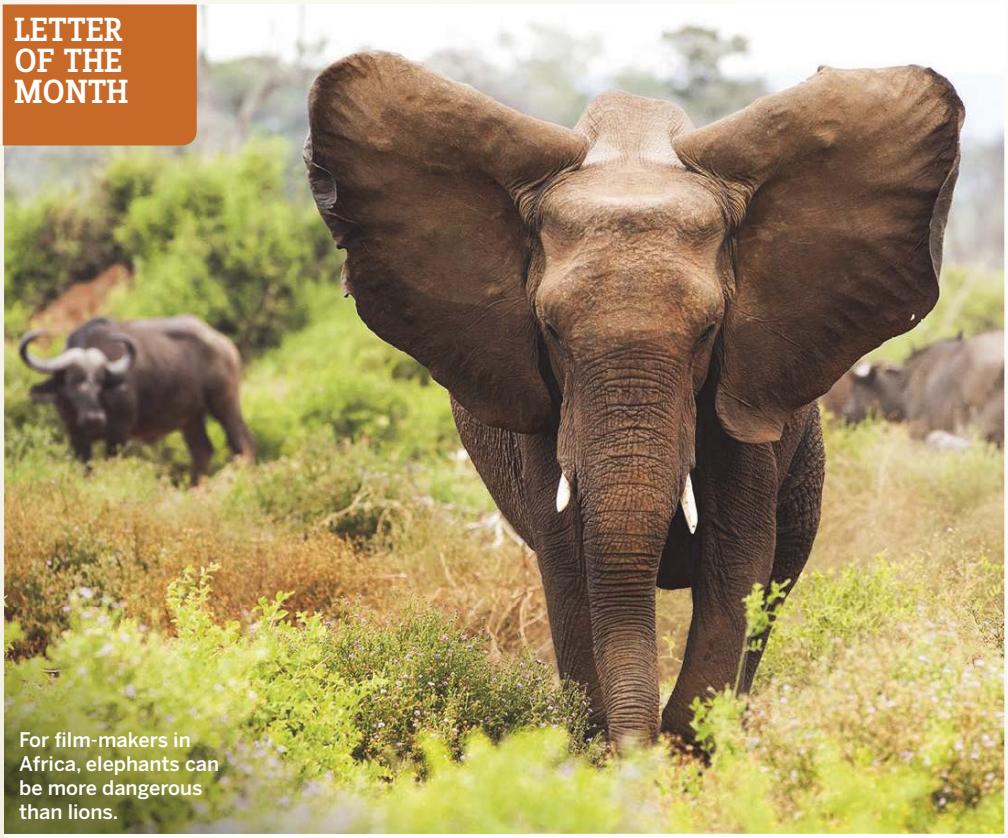
LETTER OF THE MONTH



For film-makers in Africa, elephants can be more dangerous than lions.

CAMERA CLOSE SHAVE

I thoroughly enjoyed reading the article on favourite wildlife TV moments in the January 2017 issue, and noticed that you asked us to recall our favourite moment, so here we go!

The TV moment that has always stood out for me was during the *Walking with Lions* documentary, filmed by husband and wife team Lynne and Phil Richardson in Zimbabwe. There is one particular scene that I can recall very clearly. It's when they started filming a herd of elephants, which began to give warning signs that they weren't happy with the camera crew being so close.

The crew decided to move out of sight, leaving one camera in place. One of the elephants then started to run towards the camera. You can see it charging at full speed, not looking like it was going to stop. My heart went into my mouth.

Finally, the elephant did halt, and calmly walked away as if nothing had happened.

Later in the programme, you see the camera crew approaching the remaining camera and realising that the elephant stopped just a couple of feet short of it.

I can still vividly recall the scene as it brings a sense of excitement and fear, and serves as a reminder of how important it is for us to understand animal behaviour.

Peter Horton, via email

BE A WINNING WRITER

The Letter of the Month wins a pair of HI-TEC Altitude Lite I waterproof boots, worth £59.99 and perfect for hiking. They are available in sizes 7–13 for men and 4–8 for women. For more information visit www.hi-tec.co.uk

An end to trophy hunting

I would like to thank Stuart Blackman for his story (Discoveries, December 2016) on the trophy hunting of lions in Selous Game Reserve, Tanzania, and for bringing the subject to people's attention. I'd like to strongly recommend that people read Craig Packer's book *Lions in the Balance*, which is all about this issue. It strongly reiterates Stuart Blackman's contention that the model really must change!

Ron Silver, via email

Secrets of the stone

I saw this stone on Donegal Bay beach. What could the fossil be?

Pep, via email

Natural History Museum curator, Jan Freedman replies: *The picture looks like fossil coral in limestone. Often they are weathered at strange angles, so the view you see is an irregular cross section, and so it doesn't look like a coral. Fossil coral links to the type of rocks around Donegal Bay, as they are Carboniferous in age and there are Carboniferous limestones with corals in them. It is probably a Lithostrotion coral but I'm afraid it's hard to tell which species.*

Coastal discovery: fossilised coral.

BLOGGER OF THE MONTH

This month's winner is Bug Mad Girl, who writes about exploring her garden and nearby Chiltern Hills. Read her blog at **http://bugmadgirl.blogspot.co.uk**. Visit **www.discoverwildlife.com** to find out how you can join our Local Patch Reporters Project.

Richard Du Toit/naturepl.com

ONLINE PHOTO CONTEST
THEME: BIRDS IN YOUR GARDEN

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1 TREECREEPER Northern Ireland, by Danny Gibson
2 NORTHERN CARDINAL USA, by Joel Shuford
3 BLUE TIT Kent, UK, by Claire Halas

Ice-age survivor

I liked the contrast between Irish and British wildlife in the December 2016 issue, notably Ireland lacking the large area of cold winter habitat of Scotland.

There are few endemic species in Ireland. One is the Wexford groundwater shrimp, which was only described in 1994. It was discovered 'contaminating' a family's tap water taken from a well, and may have survived in underground waters through the ice ages. Another is the Nore freshwater pearl mussel, which lives in hard water rivers like its closest relative in Spain. In contrast, the freshwater pearl mussel lives in soft water rivers in the west of Ireland and Britain.

Mark Costello, New Zealand

Who's fighting for rhinos?

The article on CITES (December 2016) mentions that China is the main culprit for the trade in rhino horn for traditional medicine. Traditional Chinese medicine is often blamed for the decline in many species, and I have often wondered what is being done to tackle the problem. I understand that there are many international organisations working on this, such as Save the Rhino and WWF, however I wondered whether there were any associations from China itself. Are you aware of any institutions working on a national, governmental, regional, and local level?

Alice Drysdale, via email

Environment editor James Fair replies: *A number of western NGOs who work on this issue are partners of organisations based out in China or Vietnam. For example, WildAid works with the Vietnamese non-profit, Change, and the African Wildlife Foundation.*

It is probably wrong to say the traditional Chinese medicine is the biggest problem these days, as it is more complex than that. A major problem seems to be its consumption by businessmen and so it is about power, influence and investment, and isn't really linked to medicinal needs.

Beetlemania

I enjoyed your December 2016 feature on dung beetles. I found this beauty sitting outside my hotel room in the Serengeti in Tanzania. It was a chilly early morning and it clearly didn't want to leave the warmth of my hands!

Louise Searl, via email


Room service: Louise holds a dung beetle in her palm.

Thanks for the memories

I found reading the 'Memorable Moments' feature in the January 2017 issue so enlightening. There are some documentaries featured that I wasn't aware of.

Sarah Brierley, via Twitter

Caterpillar tracks

Is it odd to see a caterpillar like this *(below)* in January?

@daalwhalsay, via Twitter

Entomologist Richard Jones replies: *It was probably the full-grown larva of the large yellow underwing,* Noctua pronuba, *though there are plenty of very similar-looking muddy-brown-green-mottled caterpillars. Fully grown by December, they usually burrow into the soil to overwinter, but do not pupate until spring. Finding large larvae crossing tarmac is common as they search for some soft soil in which to self-inter. Mild weather throughout the UK has meant that some caterpillars have gone on feeding into January, and only then thinking about seeking subterranean shelter.*


Larvae can leave it late to burrow.

Mistaken identity

Discoveries (January 2017) shows a picture of rockhopper penguins, not macaronis as stated. Macaronis have a more pronounced and golden crest as well as a defining pink patch at the base of the bill. They are the rarest of the breeding penguins in the Falklands.

John and Shelagh Prescott, via email

Positive outlook

I was saddened to read "The End Game" poem by Derek Gould (February 2017). I'm very optimistic for the future of our wildlife, which *BBC Wildlife Magazine* illustrates so wonderfully each month.

David Anderson, Somerset

Corrections

● The bird pictured in Discoveries (February 2017) is a siskin, not a greenfinch as captioned.

QUIZ ANSWERS (see p113)
The Wild Words are: 1 A, 2 C, 3 A, 4 C, 5 B, 6 B

INSIDE THE IMAGE

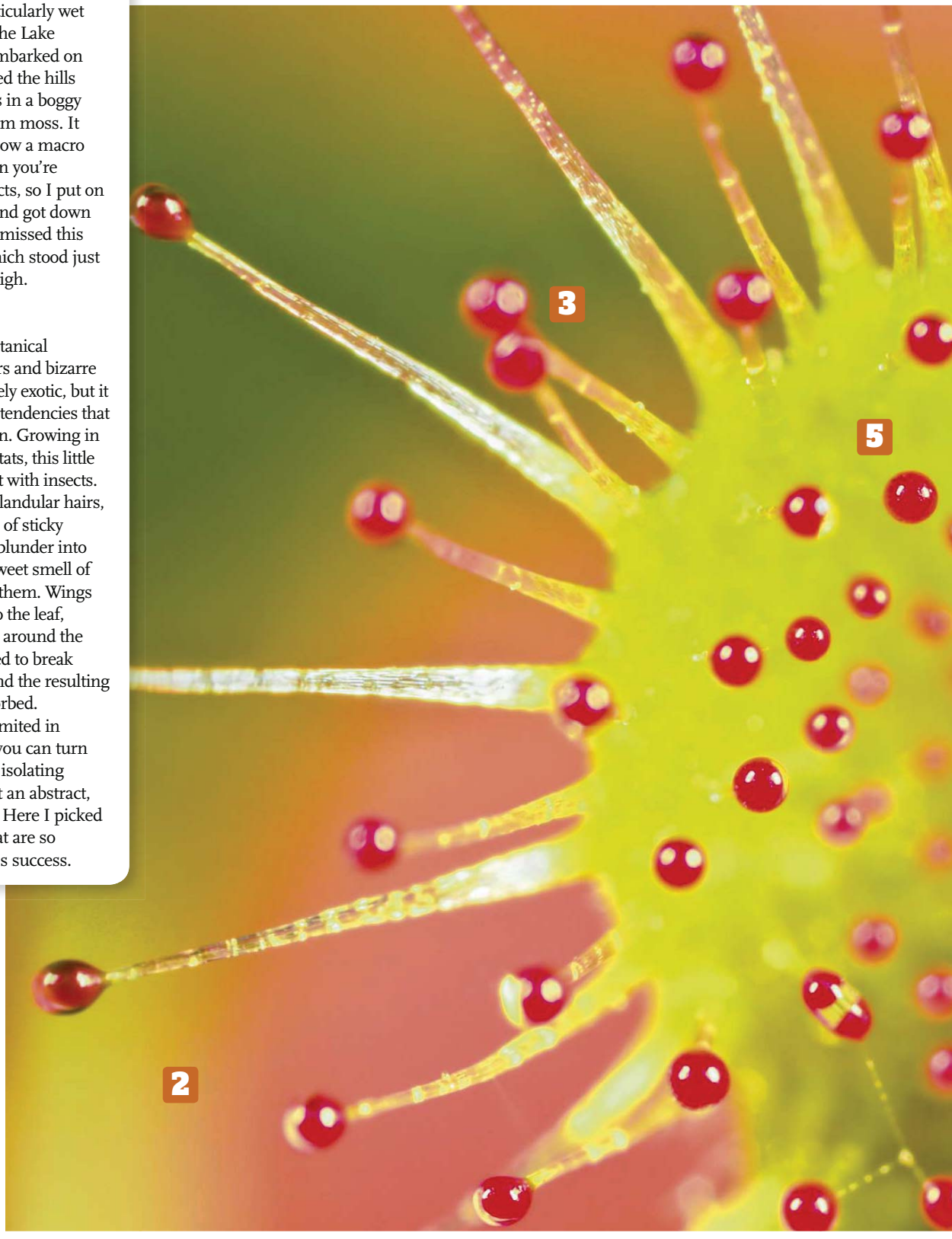
ROUND-LEAVED SUNDEW LAKE DISTRICT NATIONAL PARK

On one particularly wet July day in the Lake District, I embarked on a macro mission. I avoided the hills to seek out small subjects in a boggy area carpeted in sphagnum moss. It can be hard to visualise how a macro image might appear when you're towering over your subjects, so I put on my waterproof trousers and got down for a closer look. I nearly missed this round-leaved sundew, which stood just a couple of centimetres high.

LETHAL LEAVES

This is one of Britain's botanical wonders. Its bright colours and bizarre form make it look positively exotic, but it is the plant's carnivorous tendencies that really capture the attention. Growing in boggy, nutrient-poor habitats, this little plant supplements its diet with insects. Its leaves are covered in glandular hairs, each tipped with globules of sticky mucilage. Victims either blunder into the trap or, lured by the sweet smell of the spheres, land among them. Wings and legs quickly adhere to the leaf, which then begins to fold around the prey. Enzymes are secreted to break down the insect's body, and the resulting nutrient-rich soup is absorbed.

Depth of field is very limited in macro photography, but you can turn this to your advantage by isolating interesting details against an abstract, out-of-focus background. Here I picked out the sticky droplets that are so important to the sundew's success.



DATA FILE

CAMERA Canon 5D MK II

LENS Canon MP-E 65mm macro

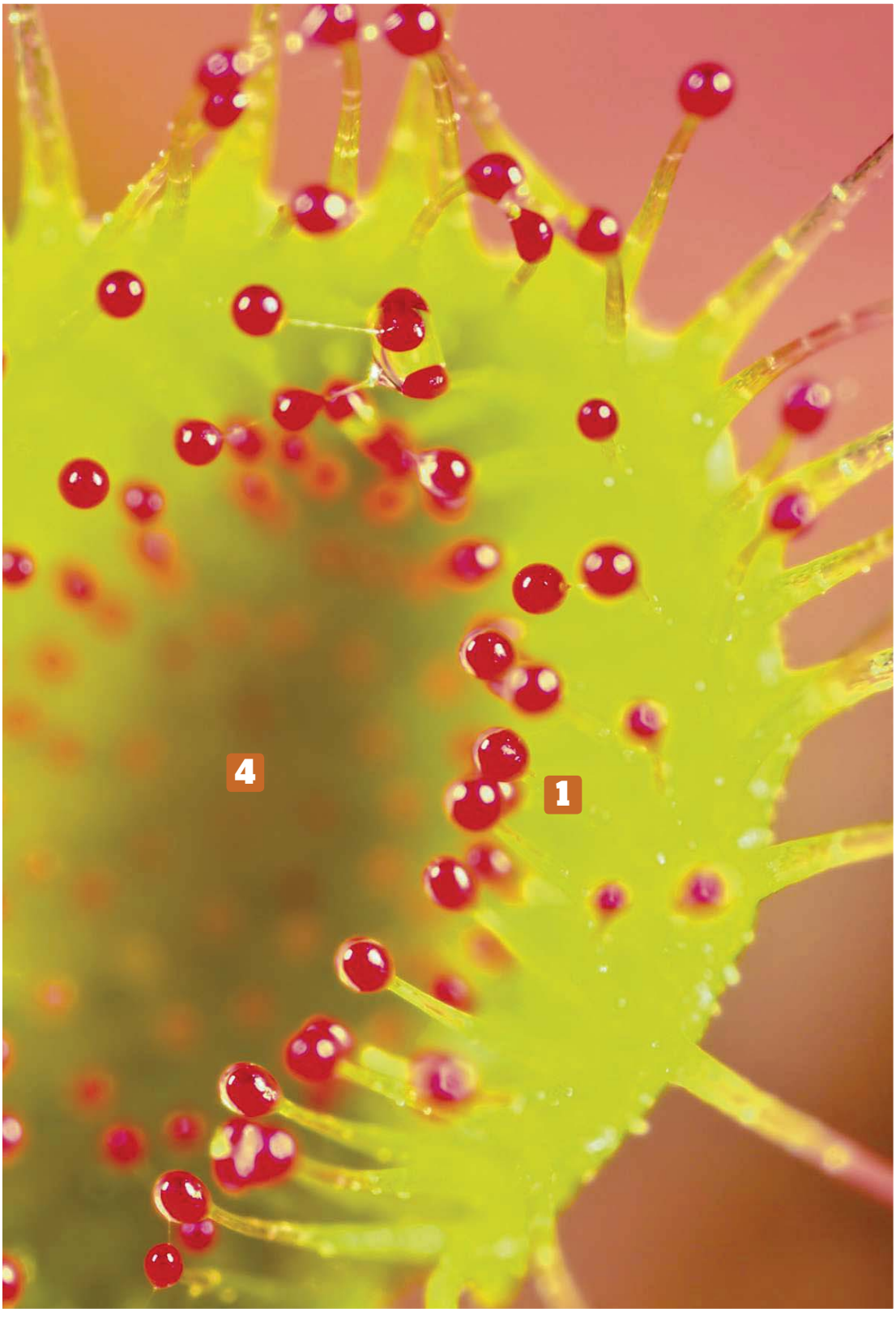
FOCAL LENGTH 65mm

EXPOSURE 1/200 sec at f8, ISO 100

NOTES Macro flash unit used to light round-leaved sundew

THE PHOTOGRAPHER
ALEX HYDE

Alex specialises in the smaller organisms that are so often overlooked. He is based in the Peak District National Park and runs tours and workshops on macro photography.



1 LYING LOW
I lay down for this image and rested my hands on the ground to stabilise the camera. I used the camera's live view to check the critical sharpness of the areas I wanted to focus on. On most cameras, you can zoom in up to x10 on live view to check the focus is spot on. Use your lens in manual focus when doing this.

2 POSITION IS EVERYTHING
I carefully positioned the camera to exclude distracting background elements such as blades of grass. The reds and greens of other sundews a few inches away give the background its colourful appearance. I used f8 to keep the background relatively soft.

3 SEEING THE REDS
At high magnification, depth of field becomes limited. In this composition I have focussed on a plane that includes a number of the sticky red hair tips. The receding, out-of-focus tips in the background add depth.

4 GUIDING LINES
The radial array of glandular hairs around the edge of the sundew act as leading lines to guide the eye into the middle of the sundew leaf, which has been placed off-centre, roughly on a third.

5 LIGHT IT UP
I used a macro flash unit (Canon MT 24EX) mounted on the end of the lens to light the subject. The flash has lifted important details out of shadow (cast by the lens that has a short working distance) and allowed the colours to come alive. The flash has also frozen any camera shake and subject movement.

FIND OUT MORE
For more photo advice visit **www.discoverwildlife.com/wildlife-nature-photography/tips-and-techniques**

YOUR PHOTOS

PHOTO CHOICE

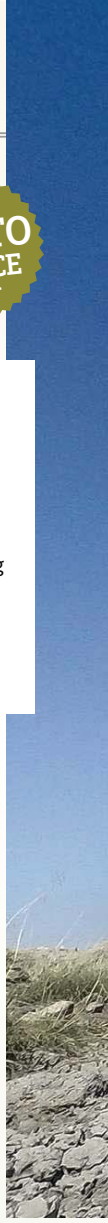
www.discoverwildlife.com is the place to see and share wildlife photos.

1 TO JUMP OR NOT TO JUMP

I was searching for jumping spiders and insects by a stream near the village of Anaikatti, Tamil Nadu, India, when I spotted this golden-backed frog on a rock. I used a wide-angle lens to photograph the amphibian in its environment, and was delighted to capture the still creature beside the babbling water.
Karthikeyan Shanmugasundaram, Kerala, India

2 BIG TUSKER

After foraging in local farmland, this colossal 47-year-old elephant bull called Tim returned to Amboseli National Park, Kenya. I was able to capture this shot in March by hiding several GoPro cameras and triggering them remotely from a distance. I was humbled by the presence of this magnificent animal.
Michael Fell, Michigan, US



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SUBMIT YOUR PHOTOS

- Enter our Your Photos competition and your image may run in the magazine: **www.discoverwildlife.com/submit-your-photos**

3 PENSIVE PRIMATE

While I was observing the Kanyantale chimpanzee community in Uganda's Kibale National Park, this curious individual with a notched ear came across the forest floor towards us. He is called Rukara, which means 'one with a dark face', and is 20 years old. I watched the great ape grooming another troop member while sitting on a log before ambling away.
Ashley Morgan, Colorado, US

4 NATURE FIX

My 79-year-old dad and I try to organise a wildlife-watching trip each month and, as neither of us had ever seen the grey seals pupping in Norfolk, we made that our goal for December. One of the pups had crawled up into the dunes and it was a surprise to see it so close! I took this photo with a long lens to avoid disturbing the cute pinniped.
Robin Bennett, Shropshire, UK

5 BATTLING OVER SCRAPS

I visited Tal Chhapar Sanctuary, Rajasthan, India, for the second time in November 2016. During my stay, I was taken to the Jorbeed dump ground. The cattle carcasses left here attract huge numbers of scavenging birds, including griffon vultures. They were fighting amongst themselves, and it was wonderful to see the action-packed drama.
Amit Kumar Ghosh, Kolkata, India

6 WINTER VISITORS

Waxwings appear in Britain every year, but sometimes we get 'waxwing winters' when the species arrives in large numbers. I saw my first waxwings in 1988 and have been a keen admirer ever since. I recently travelled to St Asaph, Denbighshire, Wales, to try and capture some images of these photogenic birds.
Keith Scovell, Merseyside, UK

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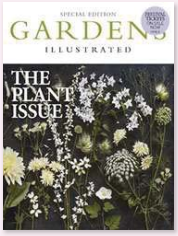

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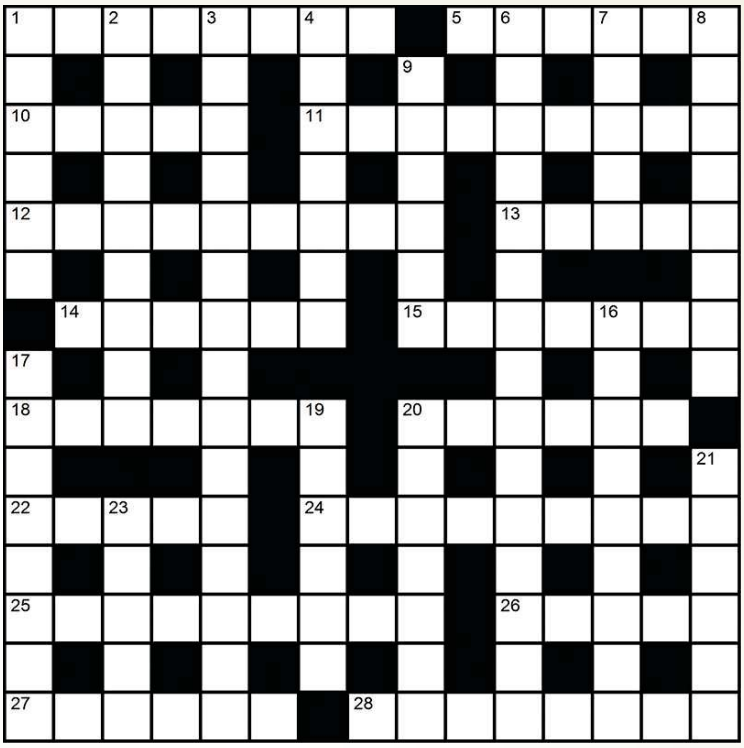
CROSSWORD

Win a prize with our brain-teaser.

Compiled by RICHARD SMYTH



Answers in our Spring 2017 issue

JANUARY ANSWERS

Across: 1 Sandbur, 5 Babbler, 9 Lepidoptera, 10 Man, 11 Mollusc, 12 Mimosas, 13 Rusts, 15 Mason Bees, 18 Harlequin, 20 Polar, 21 Skipper, 23 Bermuda, 25 Koi, 26 Roadrunners, 27 Rannoch, 28 Sea Palm.
Down: 1 Saltmarsh, 2 Nepal, 3 Bedbugs, 4 RSPB Cymru, 5 Bream, 6 Boatman, 7 Lamp Shell, 8 Rings, 14 Sardinian, 16 Songbirds, 17 Sargassum, 19 Esparto, 20 Piranha, 21 Saker, 22 Roach, 24 Urena.

JANUARY PRIZE WINNER

Hally Hardie Peterborough

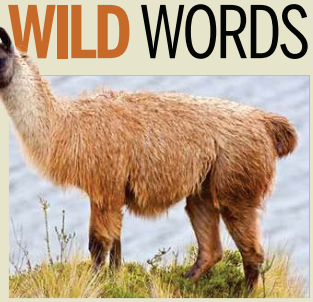
ACROSS

1 Protective cover that contains the units of reproduction of a flowering plant (8)
5 Berries that grow in clusters on a vine; used to make wine (6)
10 Great lake in North America; black-crowned night herons and double-crested cormorants can be seen there (5)
11 Fertile estuary of northern Egypt, important to migratory birds (4, 5)
12 The ___ partridge is an introduced species in the UK (3-6)
13 The large nest of an eagle or other bird of prey (5)
14 Long-legged cat of African grasslands with a black-spotted coat (6)
15 The ___ tree frog of Central America has bright-coloured peepers (3-4)
18 Genus of flowering shrubs that includes the bladder senna (7)
20 Evergreen conifers with aromatic, red-tinged wood (6)
22 Slow-moving African primate also known as a bush bear or softly-softly (5)
24 ___ *lapponica* is a rare mountain plant, discovered near Glenfinnan in Scotland in 1951 (9)
25 Rodent of central and southern Africa; shares its name with a tree genus (6, 3)
26 The ___ dock is a member of the knotweed family, native to the US (5)
27 Agreement such as the Kyoto Protocol or the Convention on the International Trade in Endangered Species (6)
28 Commercially important large fish of the family *Acipenseridae*; found in the northern hemisphere (8)

DOWN

1 African desert, home to the addax antelope and dorcas gazelle (6)
2 Member of the Otariidae family of aquatic mammals (5, 4)
3 One who seeks to protect natural habitats and wild species (15)
4 West African country where birds such as cuckoo, sedge warbler and Montagu's harrier might winter (7)
6 Bright-plumaged African woodland bird, *Anaplectes rubriceps* (3-6, 6)
7 The ___ bear is an Arctic carnivore that may weigh up to 720kg (5)
8 Algae such as kelps and wracks (8)
9 The greater ___ is a marsupial with wing-like flaps that enable it to travel through the air (6)
16 Historic English county, home to the RSPB's Bempton Cliffs reserve (9)
17 Flowering perennial plant, *Hylotelephium spectabile* (3, 5)
19 Venomous snakes native to the UK (6)
20 Small bird of the family Paridae with a black cap and white nape (4, 3)
21 Fig-tree native to India (6)
23 Pacific Islands gardenia with iconic white flowers (5)

WILD WORDS



Alamy

1) The definition for ostreger

A a keeper of goshawks
B the large paunch of a pig
C the down on the sprouting horns of a young deer

2) The animal you associate with the adjective galline

A a lobster
B a grasshopper
C a chicken

3) The offspring of a cockroach

A a nymph
B a hatchling
C a puggle

4) The sound made by hares

A a trill
B a drum
C a squeak

5) The name for a male llama

A a buckling
B a macho
C a billy

6) The collective noun for swallows

A a tiding
B a gulp
C a watch

Find out the answers on p107

Questions set by ADAM JACOT DE BOINOD

WIN PERKINS AND MORLEY GOODIES

HOW TO ENTER This competition is only open to residents of the UK (including the Channel Islands). Post entries to ***BBC Wildlife Magazine*, March 2017 Crossword, PO Box 501, Leicester, LE94 0AA** or email the answers to March2017@wildlifecomps.co.uk by 5pm on **3 March 2017**. Entrants must supply name, address and telephone number. The winner will be the first correct entry drawn at random after the closing time. The name of the winner will appear in the Spring 2017 issue. By entering participants agree to be bound by the general competition terms and conditions shown on this page.

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Tales from the bush

A WILD WORLD OF RIPPING YARNS

WHO?

PROF ALASTAIR DRIVER is one of the UK's leading conservationists and recently retired as the head of the Environment Agency's biodiversity team.

WHAT?

A MYSTERY ORPHAN

WHERE?

BERKSHIRE

Time for tea: an orphan pup is rescued by Alastair and his family and given warm milk in a *Thomas the Tank Engine* mug.

AN UNUSUAL LOOKING PUPPY RESCUED FROM THE COLD BY ALASTAIR IS NOT WHAT IT APPEARS TO BE.

One of the many joys of being the local "bloke wot does nature 'n' that" is that you get phone calls out of the blue when people have found weird and wonderful creatures, or signs of wildlife, in the village and want to know more. My most recent call came from the former chairman of our Parish Council who had stumbled across a tiny frozen animal near the village nature reserve I look after and wondered what it was.

I grabbed my bike and did my best Jason Kenny impression into an icy north-easterly wind on the way to retrieve the small, cold bundle, and immediately identified it as a newborn puppy. It was an unusual-looking one, I had to admit, but someone had clearly decided a new dog was not something they could cope with.

Being a softie at heart, I agreed to take the little chocolate-brown furball, with his snub nose, still-closed eyes and strange pink under-paws, home and revive him, which I duly did with warm blankets and milk and the willing help of my even softer family.

"Aaaaaah! Can we keep it?" was my wife's first reaction. Having firmly put that idea to bed, I speculated that it was "probably an Alsatian/large dog hybrid", gave it the temporary name of Little Bear and offered it to my brother-in-law's family who had sadly lost their dog recently. Despite a threatened hunger strike from his three young daughters, Andy, rather fortunately as it transpired, turned the offer down.

Local authorities are duty-bound to collect reported strays, so I called out the friendly Wokingham borough council animal warden, Mandy, who arrived very quickly. "Are you sure it isn't a baby fox?" she asked, "because they're chocolate brown". I had never seen a newborn fox cub and it hadn't entered my head that this could be a wild canine.

A search of baby fox cub images on the internet immediately revealed a photo of what could have been Little Bear himself. I was suitably embarrassed, having been a country boy all my life, I thought I would be stripped of my naturalist status when the news spread through the village.

We cannot be sure what happened but we surmised that a vixen had probably been carrying her cubs across the field to another den site when she had been disturbed and dropped one of them. In this situation, cubs can easily become abandoned, especially in public places during daylight.

So Little Bear's fate wasn't to end up in a stray dog home, but instead in St Tiggywinkles wildlife hospital. On arrival, he was whisked off to a veterinary nurse for a health check and was later introduced to three other young cubs that been brought in.

A few months later Little Bear and his new 'siblings' were successfully released into a Chilterns country estate, where I am confident he has been enjoying the freedom of the wild that was always his due.

I WAS SUITABLY EMBARRASSED, HAVING BEEN A COUNTRY BOY ALL MY LIFE, I THOUGHT I WOULD BE STRIPPED OF MY NATURALIST STATUS.

● Do you have a tale that you would like to share? If so, please email a synopsis of your idea to **james.fair@immediate.co.uk**

Alastair Driver

Reef & Rainforest

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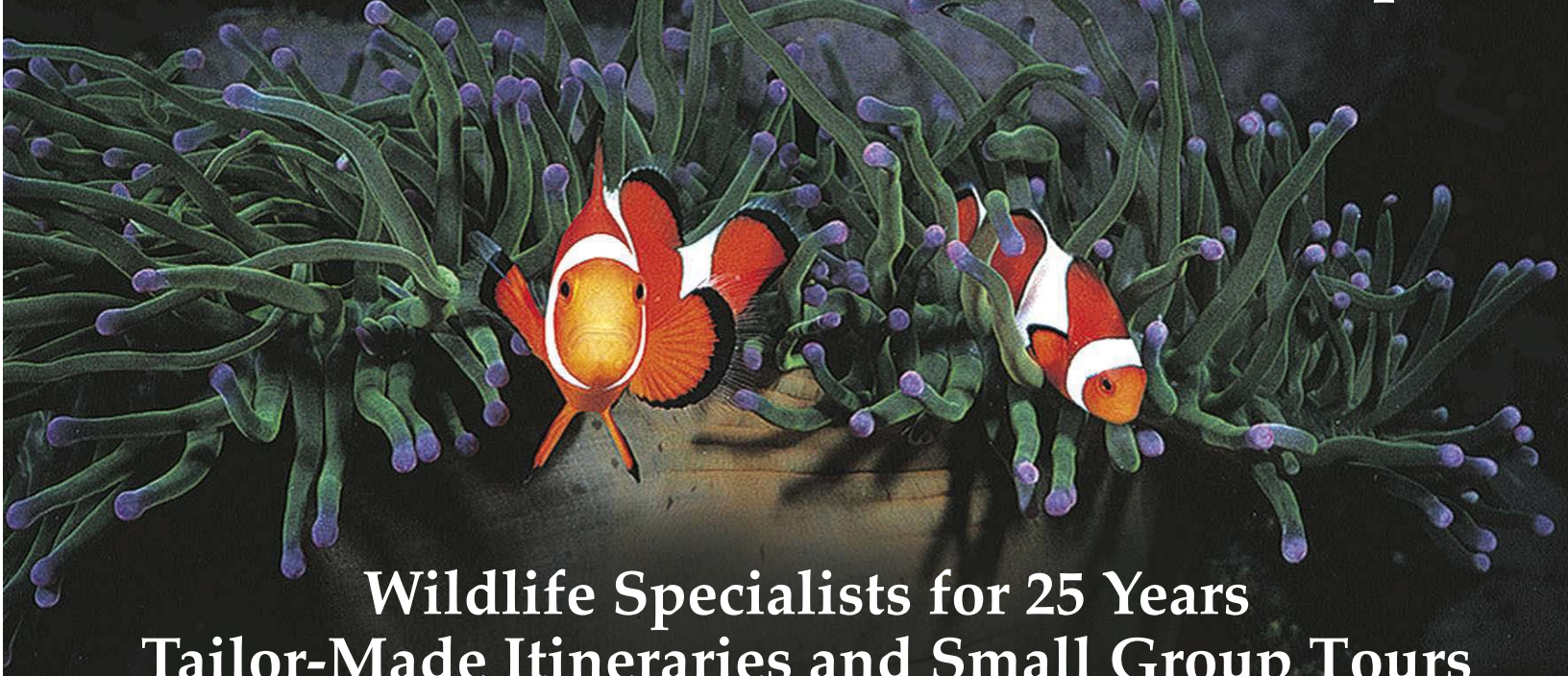

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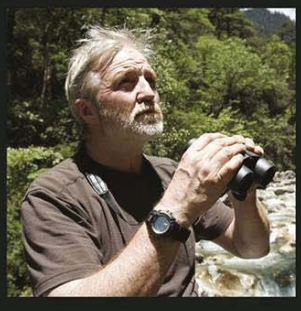

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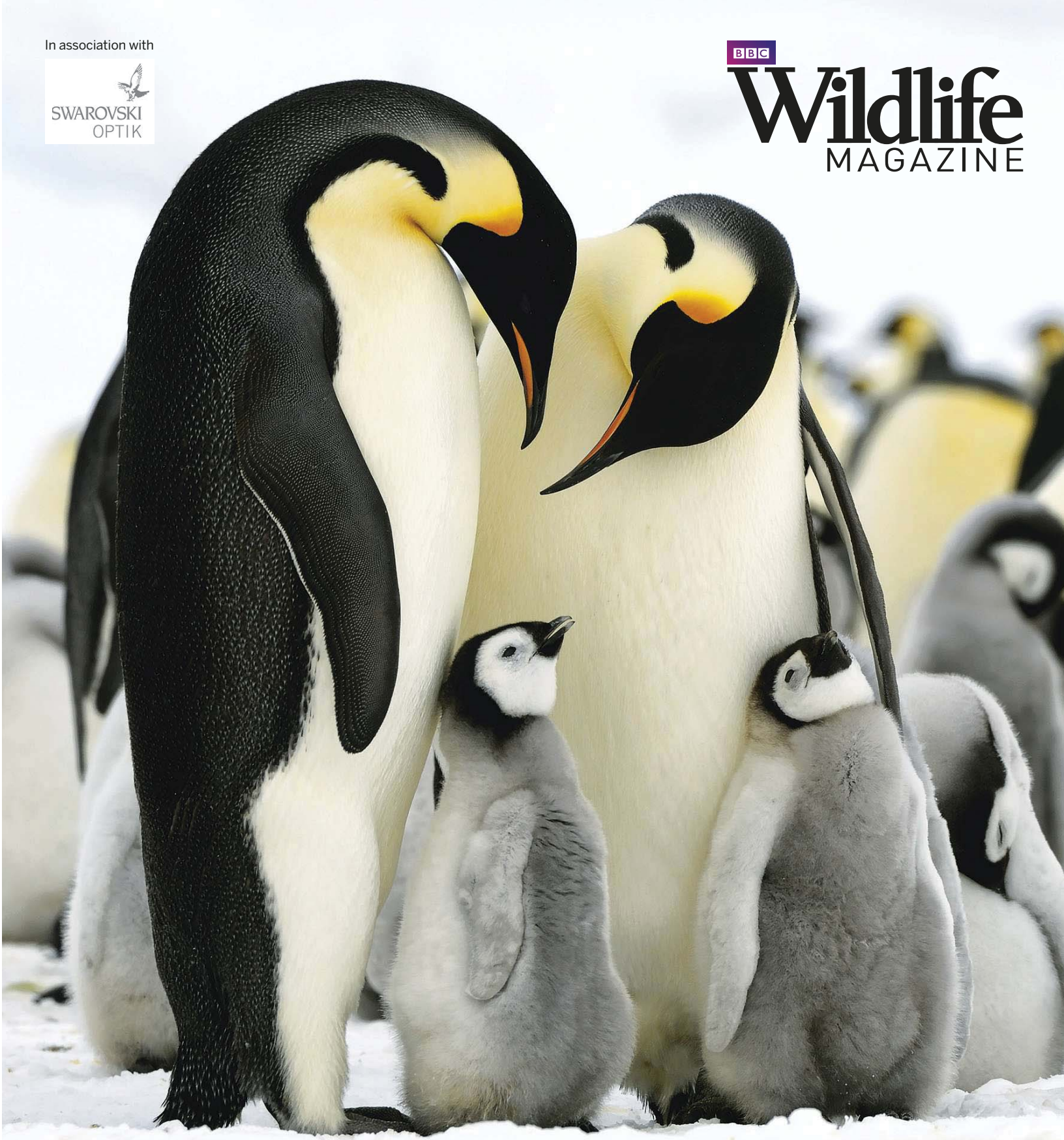

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40 AMAZING SPECTACLES AT HOME AND ABROAD TO ENJOY IN 2017

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2017 WILDLIFE ENCOUNTERS

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Polar Bear © S Blanc

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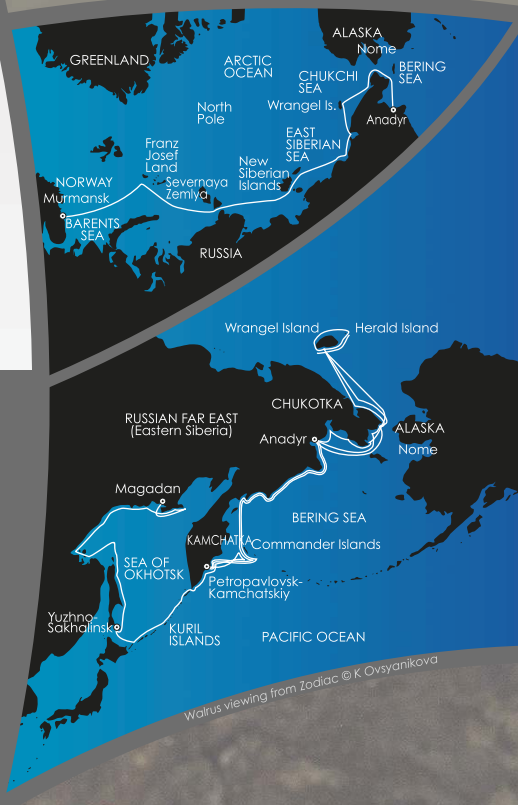

Walrus viewing from Zodiac © K Ovsyanikova

RUSSIA'S WILDLIFE HIGHLIGHTS THIS YEAR

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- Numerous sightings of Steller's Sea Eagles
- Spectacular Ribbon Seals lazing on ice
- Large pods of Orca, Gray, Humpback, Beluga and Minke Whales
- Snowy Owls, Arctic Fox and other Arctic wildlife
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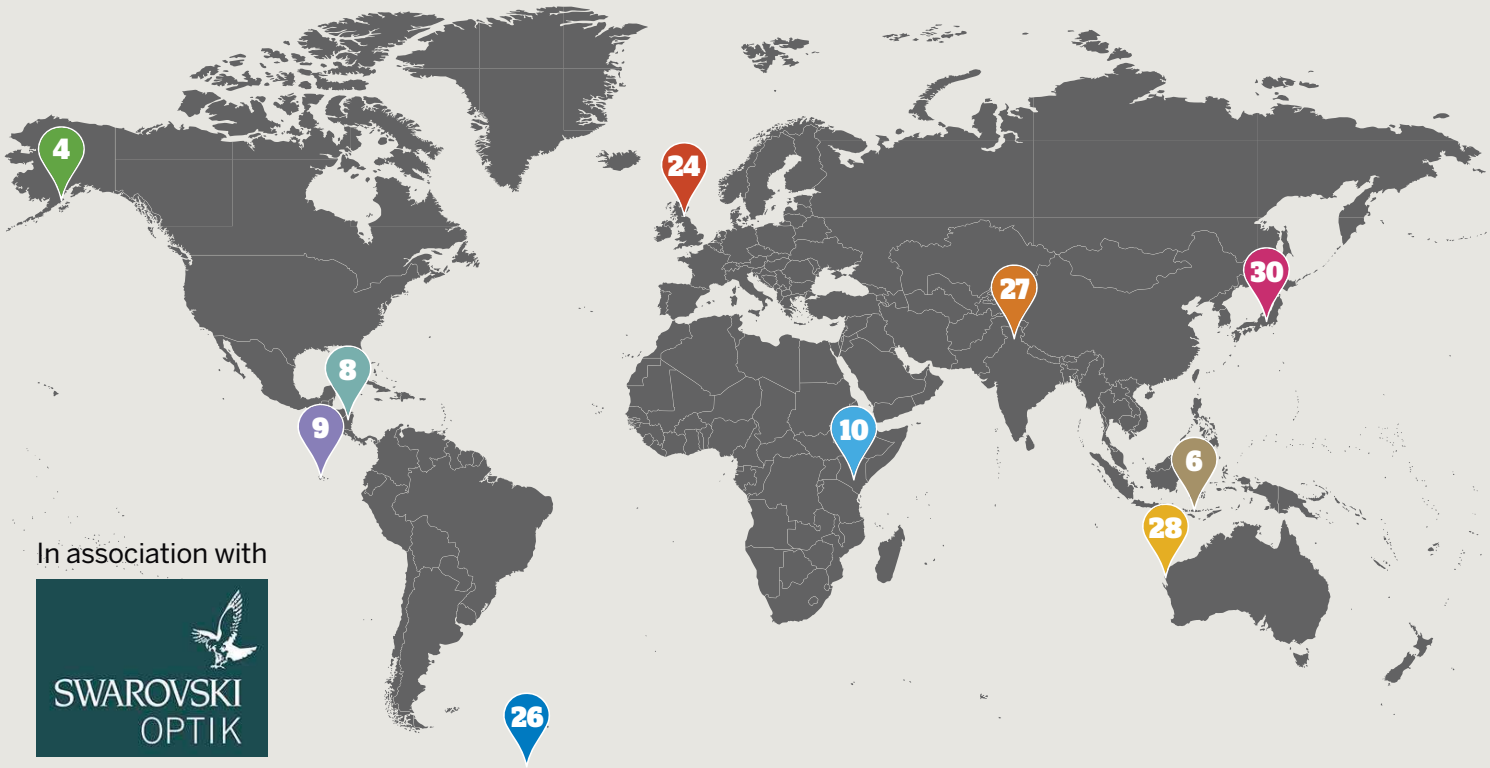
Welcome

Casting my eye over our selection for this year's travel supplement, one thing struck me about what links most of our top choices – water. Wild animals love water. Some, like whale sharks (Australia), literally can't live without it, while others, such as sealions (South America) and gannets (Europe), are entirely dependent on the sea for their food. But for the salmon-fishing bears of Alaska (North America) or Japanese macaques (The Far East), the relationship is more subtle. As for the Serengeti's wildebeest (Africa), crossing the Mara River is a considerable source of danger. But all of these make for unforgettable wildlife experiences.

James Fair
Environment Editor, *BBC Wildlife Magazine*

Cover: Wolfgang Kaehler/Getty



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North America

Salmon-fishing bears

Katmai National Park, Alaska

In some parts of Alaska, the sockeye salmon is easily the most important component of a brown bear's diet, contributing to between 60–80 per cent of its annual nutritional intake. But since the salmon are only 'running' for three months of the years, the bears must make the most of the opportunity when it comes along. 'Carpe diem', as the phrase goes – or 'Carpe salmo', perhaps. The need to gorge while the going is good means a dominant male can catch up to 30 fish a day at Brook Falls, in Katmai National Park, helping to add up to 180kg of body weight – that's nearly three average-sized humans – to help see him through his winter hibernation. While this spectacle is taking place on many of Alaska's rivers, Brook Falls is the acknowledged bear-fishing capital of the world. In the peak season – July and September are the best months – operators say they can see six bears a day, and sometimes as many as 24. If this isn't the best brown bear-watching place in the world, then we at *BBC Wildlife Magazine* would like to know what is.

Best of the rest

MONARCH BUTTERFLIES
CENTRAL HIGHLANDS, MEXICO
Millions of butterflies return on a 4,000km migration from Canada to the Monarch Butterfly Biosphere Reserve in late-October.

GARTER SNAKE EMERGENCE
MANITOBA, CANADA
In May, up to 10,000 snakes can come out of a hibernation den near Narcisse, in the state of Manitoba.

MIXED CETACEANS
BAY OF FUNDY, CANADA
Fin, humpback and minke whales and white-sided dolphins are all here over the summer months.

Andy Rouse/naturepl.com

Sushi monster: brown bears use a variety of fishing techiques to catch salmon, including 'snorkelling' for them underwater.

South-east Asia

Komodo dragons

Komodo & Rinca, Indonesia

"There's one looking straight at me," remarks Stephen Fry in the 2009 series *Last Chance to See* that he co-presented with *BBC Wildlife* columnist Mark Carwardine, "and I have to say, it's one of the most malevolent expressions I've ever seen on any living thing." Malevolent or not, Komodo dragons are the largest member of the monitor lizard family, occasionally reaching a length of 3m and weighing up to 90kg. Historians speculate that Chinese traders, travelling to the Lesser Sunda Islands in the 2nd century, came across these fearsome beasts and returned home with stories that exacerbated, or even inspired, dragon mythology. Some maps, it is said, are inscribed with the legend, "Here be dragons". They are certainly fearsome beasts, possessing huge claws that can disembowel a horse, a thick muscular tail that can knock over a water buffalo, teeth like a shark's and a mouth full of venomous saliva with anticoagulant properties that ensures anything they bite dies a slow and painful death. Did its long, forked tongue, which is able to detect a rotting carcass from some 4km away, encourage traders to say these dragons breathed fire?

Best of the rest

PROBOSCIS MONKEYS
SABAH, BORNEO
Kinabatangan is easy to reach and has good numbers of these stunt-performing monkeys.

NESTING GREEN AND HAWKSBILL TURTLES
SIPADAN & TURTLE ISLANDS PARK, BORNEO
Peak season for greens is July to October, and for hawksbills February to April.

ORANGUTANS
SUMATRA, INDONESIA
Head to Sumatra to see the Critically Endangered Sumatran orangutan, while their Bornean cousins can be found in Tanjung Puting NP in Kalimantan.

Ringo Wong hkherper/Getty

Dragon eat dragon: Komodo dragons are not fussy, so newly hatched lizards must quickly scale a tree in order to avoid becoming a snack for a hungry adult.

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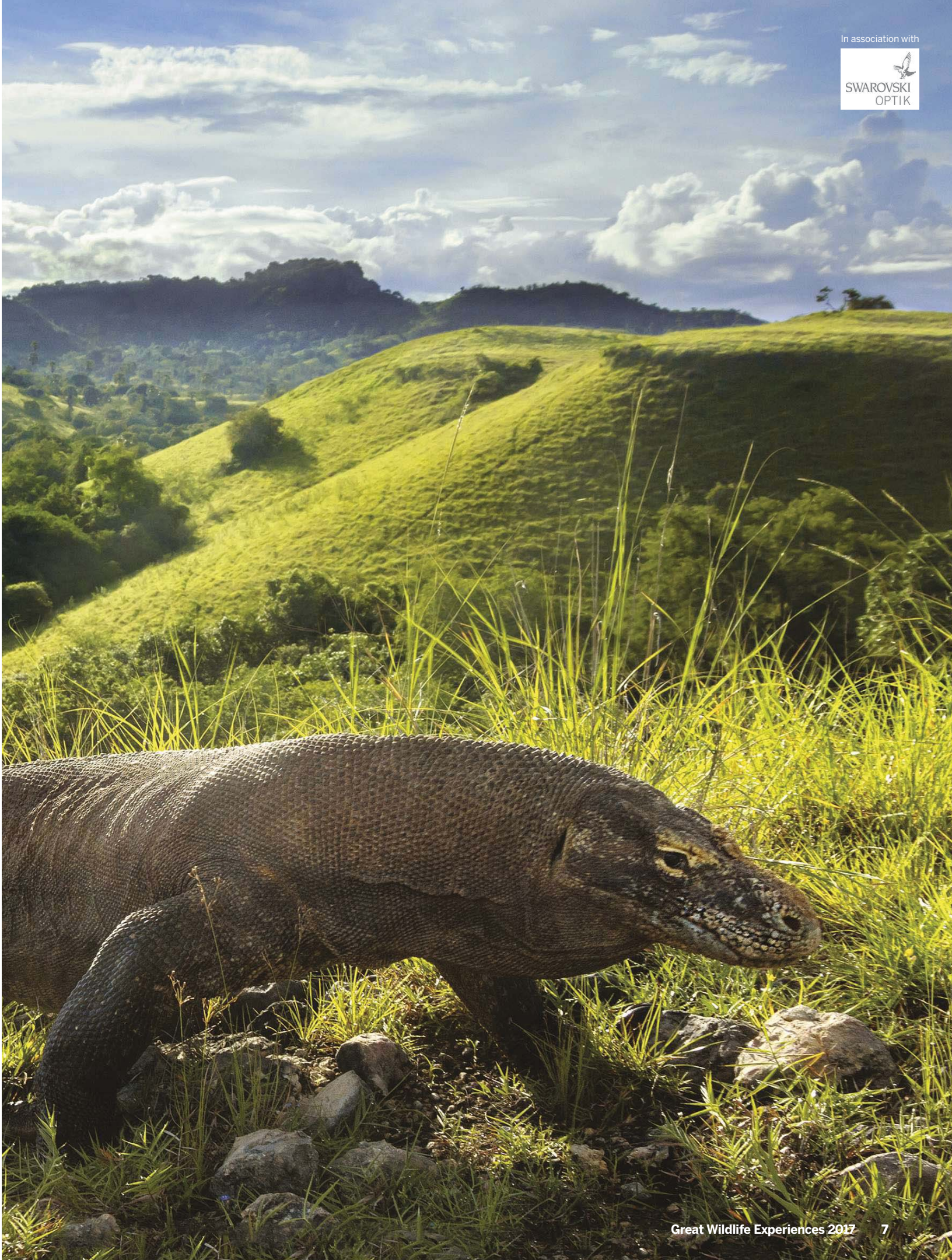

A range of vocalisations are produced by mantled howler monkeys, including barks, woofs and grunts.

» Central America & Caribbean

Howling howler monkeys

Tikal, Guatemala

For an animal the size of a small dog and weighing about 7kg, the howler monkey is incredibly noisy. Its guttural roar (in truth, it's nothing like a howl) is said to be one of the loudest of any terrestrial animal on Earth, and a group of monkeys in concert can be heard up to 5km away. There are 15 different species, and many are of them are not rare, so you don't have to go to the remote Mayan ruins of Tikal to find one – in this case, the Yucatán or Guatemalan black howler monkey. But the extraordinary location, with its unique stone temples towering above the surrounding rainforest, make this an extra special place to hear the monkey's roar. To get the best effect, you'll need to be here either early in the morning or as the sun is going down, for that's when the monkeys are most vocal.

Best of the rest

ATLANTIC SPOTTED DOLPHINS
THE BAHAMAS
Spotted dolphins can be seen all year round throughout the Bahamas, but Little Bahama Bank – a huge area of clear, shallow water on the north side of Grand Bahama – is especially renowned.

LEATHERBACK TURTLES
TAMARINDO, COSTA RICA
The world's largest turtles lay their eggs at Playa Grande from October to March.

SCALLOPED HAMMERHEAD SHARKS
COCOS ISLAND, COSTA RICA
Nutrient upswellings from June to December attract hammerheads, manta rays and whale sharks.

Howler: David Tipling/FLPA; seal ion: David Fleetham/naturepl.com

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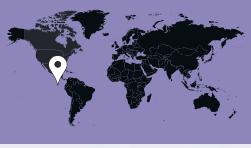
South America

Swimming with sealions

Galápagos National Park, Ecuador



As Galápagos species go, the Galápagos sealion isn't special. It's not endemic (they also live off the coast of Ecuador), and there are many other members of the islands' fauna that have carved out more extraordinary niches – the marine iguana springs to mind, as does the giant tortoise. But while the Galápagos are famous as the crucible that helped Charles Darwin form his theory of evolution, this doesn't mean you shouldn't have some fun while you're there. It's not all work, work, work. After a hard day contemplating how land iguanas adapted to a marine lifestyle and a diet of algae, nothing beats donning your mask and diving into the Pacific Ocean for some playtime. Sealions do know how to play, and as long as you give them ample space, their innate curiosity will give you the extraordinary sensation of (almost) understanding what it's like to be one. Santa Fé and La Loberia beach on San Cristóbal are great locations for close underwater encounters of the pinniped kind.

Best of the rest

PARROTS AT CLAY LICKS
TAMBOPATA, PERU
Parrots and macaws visit clay licks most days.

BEACHING ORCAS
PENINSULA VALDES, ARGENTINA
Orcas feast on southern sealion pups February-April.

JAGUARS
THE PANTANAL, BRAZIL
The June-November dry season is the best time.

Seeing fins: Galápagos sealions forage in shallow water for fish, squid and octopus, but juveniles will swim with people for the sheer fun of it.

Federico Veronesi/Nature in Stock/FLPA

» Africa

The wildebeest migration

Masai Mara & Serengeti, Kenya & Tanzania

There are other great migrations in Africa. In Botswana, thousands of plains zebras travel 1,000km – the longest terrestrial journey of any mammal on the continent – from the floodplains of the Chobe River to the Nxai Pan and back again every year, while in South Sudan, some 1.2m or more antelopes, including 800,000 white-eared kob, form herds 80km long and 50km wide. But still, the wildebeest migration in the Serengeti and Masai Mara is the spectacle with which all others must bear comparison. While the sheer numbers – often cited at about 1.5m animals in total – are mind-boggling, and the grisly challenge of the Mara and Grumeti river crossings exhilarating, it is perhaps the migration's never-ending circularity that gives it the greatest resonance. The synchronised calving of the wildebeest on the Serengeti's Southern Plains in February – attracting the whole gamut of predators from lions to hyenas – is another remarkable facet of this awe-inspiring phenomenon.

Best of the rest

STRAW-COLOURED BAT MIGRATION
KASANKA NP, ZAMBIA
An estimated 10m straw-coloured bats descend on Kasanka between October and December.

MOUNTAIN GORILLAS
RWANDA & UGANDA
All year round – Volcanoes National Park and Bwindi Impenetrable Forest are where they hang out.

THE SARDINE RUN
KWAZULU-NATAL, SOUTH AFRICA
From May to July, millions of migrating pilchards attract huge numbers of oceanic predators.

Round and round: the broadcaster Jonathan Scott has said of the migration, "The only beginning is the moment of birth", because it is an endless cycle – of life and death.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CAN YOU SEE WHAT I SEE?

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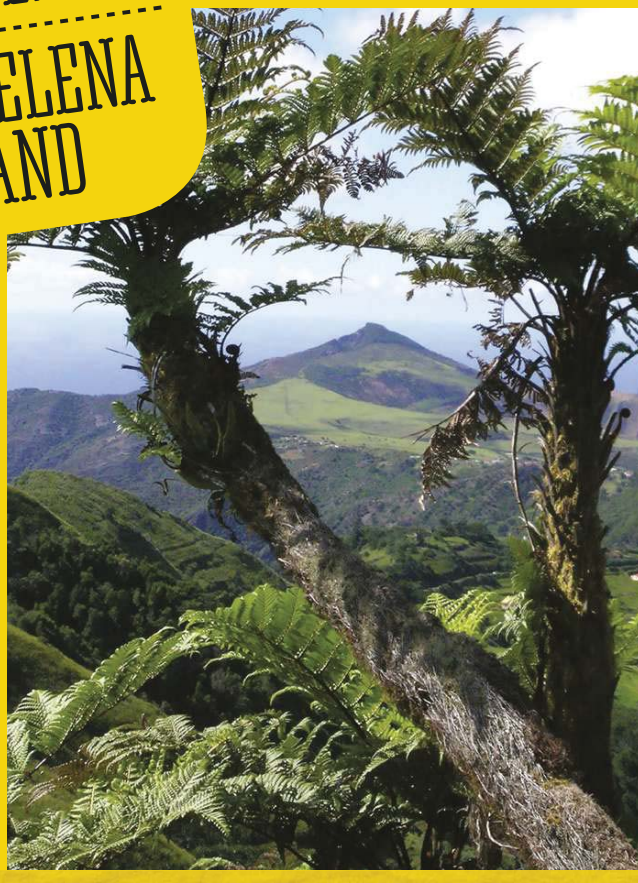
BIRDING & WILDLIFE

St. HELENA ISLAND



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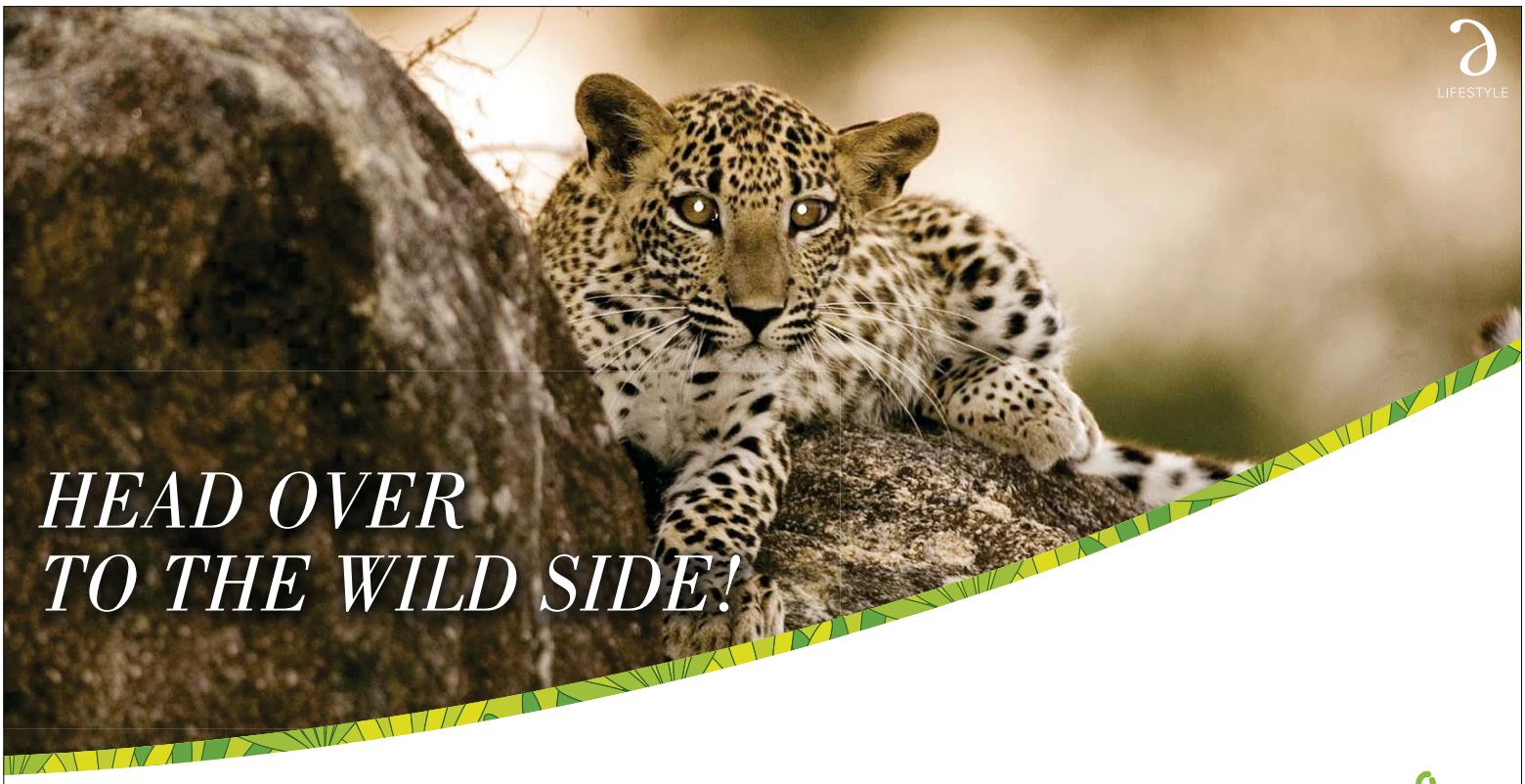

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They also offer a range of dedicated wildlife photography tours throughout Africa with acclaimed photographer Nick Garbutt. You can benefit from Nick's personal tuition, informal workshops and wildlife expertise. Nick's photographic tours include Tanzania's Serengeti migration where one can witness the annual migration of hundreds of thousands of wildebeest, zebra and other game, or enjoy taking in Madagascar's extraordinary habitats and unique wildlife on a specialist trip in search of lemurs, chameleons and other endemics in lush, verdant rainforest.

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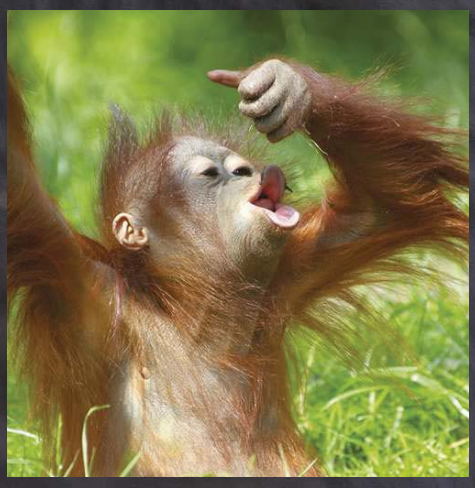

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» Europe

Plunge-diving gannets

Bass Rock, Scotland

If you've ever wondered where the northern gannet gets its scientific name *Morus bassanus*, then a visit to Bass Rock should put an end to your contemplation. Bassanus ... Bass Rock – yes, the bird gets its name from this volcanic plug squatting in the outer edges of the Firth of Forth. Some 75,000 pairs breed and raise their chicks here, almost a fifth of the global population, and the sight of even 10 of them hanging in the air, those lovely emulsion-white feathers gently tousled by the wind, before the inevitable, stomach-churning plunge, is enough to melt even the hardest of hearts. Then add this to the mix: gannets are a wildlife success story. Numbers in the UK have increased by a third in a decade and on the rock by more than 50 per cent in the same period. That such a tiny island – roughly the size of four football pitches – that was once home to Christian hermits and later a notorious prison should come to be so significant a site for our largest seabird surely gives some grounds for optimism.

Best of the rest

WOLF-TRACKING
CARPATHIAN MOUNTAINS, ROMANIA & SLOVAKIA
Wolf-tracking is best from January to March.

VULTURE FEEDING STATIONS
PYRENEES, SPAIN
The one at Garganta de Escuaín in Ordesa National Park even attracts rare bearded vultures.

BROWN BEARS HIDES
ALUTAGUSE, ESTONIA
Bears visit hides May to mid-July and Sept to October.

Richard Shucksmith/Nature in Stock/FLPA

In association with
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Animal athletes: hitting the water at nearly 90kmh and up to 60 times a day, gannets are wildlife's Olympic champions at the high dive.

They might be giants: emperors are the world's largest penguin – an adult averages 1.15m tall, about the height of a six-year old child.

Antarctica

Emperor penguin breeding colony

Weddell Sea, Antarctica

Emperor penguins are not like other penguins. They're not like other birds. They are not quite like most other living things on the planet. Most animals reproduce just as the weather is beginning to warm up in the springtime in order to give their offspring the best possible chance of survival. It's a pretty standard template that's evolved over millions of years and it mostly works. Emperor penguins, however, do it the other way round. They lay their eggs in the howling gales and extreme sub-zero temperatures of an Antarctic winter. The female immediately sets off on a fairly lengthy fishing expedition, while the male keeps the egg, and later the chick, warm until she returns to take over childcare duties. The reason for this topsy-turvy approach is because once that first winter has passed, it gives the chicks longer to mature before the next one comes along. For the casual tourist, it's hard to get to an emperor penguin colony when eggs are being laid or chicks are hatching (typical temperatures could be -35˚C, then add in the windchill factor), but there are operators who will get you there in November and December – the Antarctic summer – when adults will still be feeding their now nearly adult-sized chicks. Some operators go to the 4,000-strong emperor penguin rookery just south of Snow Hill island, others to the colony at Gould Bay on the Weddell Sea. If you do make it, the chances are it will truly be a once-in-a-lifetime experience.

Best of the rest

NESTING ALBATROSSES
SOUTH GEORGIA
Black-browed albatrosses are raising chicks here from late December or early January.

CETACEANS AND SEALS
PARADISE BAY, ANTARCTIC PENINSULA
Described as one of the most beautiful natural harbours in the world, you could see anything from crabeater seals to killer whales.

SOUTHERN ELEPHANT SEALS
SEA LION ISLAND, THE FALKLAND ISLANDS
Alpha males start returning to the beaches in late August, and the females give birth to pups between September and November.

Penguins: Wolfgang Kaehler/Getty; snow leopard: Steve Winter/Getty

In association with
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» Indian subcontinent

Encounters with snow leopards

Hemis National Park, India

In 1973, the American author Peter Matthiessen accompanied the great field biologist George Schaller on his study of blue sheep in Nepal, and later wrote the travel classic *The Snow Leopard*, even though he never laid eyes on one during the two-month trip. Thanks in part to the book, but also their elusive nature, snow leopards became a byword for something as mythological and cryptic as the yeti – despite the fact that they were real. How things change. The advance of digital technology has led to the development of cheap, easy-to-use remote cameras, and they have not only helped scientists uncover details of their once-mysterious lives but also made it far easier to see them in the flesh, because we know much more about where and how they live. The increased visibility of snow leopards is having broader positive impacts: tourists to locations such as Hemis, high up on the Tibetan plateau in northern India, give them an economic value to the people with whom they share this icy world. That can only be good news for the mountain ghost.

Best of the rest

TIGER SAFARI
TADOBA ANDHARI NP, INDIA
One of the most popular reserves in India – tiger sightings peak in the hottest months of April and May.

ELEPHANT GATHERING
MINNERIYA NP, SRI LANKA
In the dry months of July to October, elephants congregate around Minneriya's artificial water sources.

GREATER ONE-HORNED RHINOS
KAZIRANGA NP, INDIA
The park is open from November to the end of April.

Hardy climbers: snow leopards can range to altitudes of 5,000m – higher than any mountain in Western Europe – though between 3,000 to 4,500m is more usual.

Dive masters: at Ningaloo, whale sharks feed at the surface, but they can also descend very deep – one tagged individual was recorded spending 12 hours at a depth of 974m.

Andy Rouse/naturepl.com

» Australasia

Swimming with whale sharks

Ningaloo Bay, Western Australia

Whale sharks can be identified by a tool originally developed by NASA to chart the night sky. But instead of mapping stars, the algorithm analyses the pattern of spots on their flanks and topsides and compares them to other sharks in a database. Getting into the water with one, then, could be likened to taking a dip with a living galaxy. And while that might be stretching things a little, with its gaping mouth, strangely flattened head, the ridges along its side and the dense pattern of spots set against an inky-black background, a whale shark could legitimately be described as being out of this world. At up to 12m long it is the largest fish on Earth. Of course, there is nothing to fear from these sharks, because despite their size they eat nothing much larger than a shrimp. The best time to head to Ningaloo Bay is between mid-March and mid-September. While sightings can never be guaranteed, some operators claim a success rate of greater than 98 per cent, and offer you another go if you're one of the unlucky few who misses out. It's got to be worth a try.

Best of the rest

KIWI
STEWART ISLAND, NEW ZEALAND
Stewart Island (and those just offshore) are the best locations to see New Zealand's endemic birds.

BIRDS OF PARADISE
PAPUA NEW GUINEA
See more than 20 species of bird of paradise in a trip to the world's second largest island.

SWIMMING WITH HUMPBACK WHALES
TONGA
Humpbacks come to Tonga and other South Sea islands from July to September to calve.

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The Far East

Bathing Japanese macaques

Jigokudani Yaen-koen, Japan

It is probably true, as the Jigokudani Yaen-koen 'wild snow monkey park' website says, that there are many notable aspects of the lives of these Japanese macaques, other than the fact that they bathe in thermal springs. But, really, it's difficult to imagine what. This is the place where – in 1963 – a young female macaque called Mukubili first went into one of the springs to retrieve some soya beans, and found the 43˚C temperature of the water was preferable to the sub-zero one of the chilly mountain air. The practice soon spread, first to younger monkeys, then to all those in the area, and since then the monkeys have featured in dozens of natural history documentaries and been snapped by thousands of professional wildlife and enthusiastic amateur photographers. They are primate superstars. Even before this extraordinary cultural shift in behaviour, the monkeys were record-breakers – humans excepted, they are the most northerly living primates in the world, and in this part of Honshu island, as they endure temperatures as low as -15˚C in winter and high as 23˚C in summer.

Best of the rest

BROWN BEARS
KAMCHATKA, RUSSIA
Trips to the land of fire and ice to see bears run in July and August.

RED-CROWNED CRANES
HOKKAIDO, JAPAN
February is the best time to go for this crane's famous mating dance.

GIANT PANDA
QINLING MOUNTAINS, CHINA
The best time for tracking pandas in the Qinling Mountains is November to March.

Monkey business: Japanese macaques may bathe like humans, but they have a much broader diet – nuts, fruits, fungi, insects and the parts of at least 213 species of plant are all consumed.

Anup Shah/Minden/FLPA

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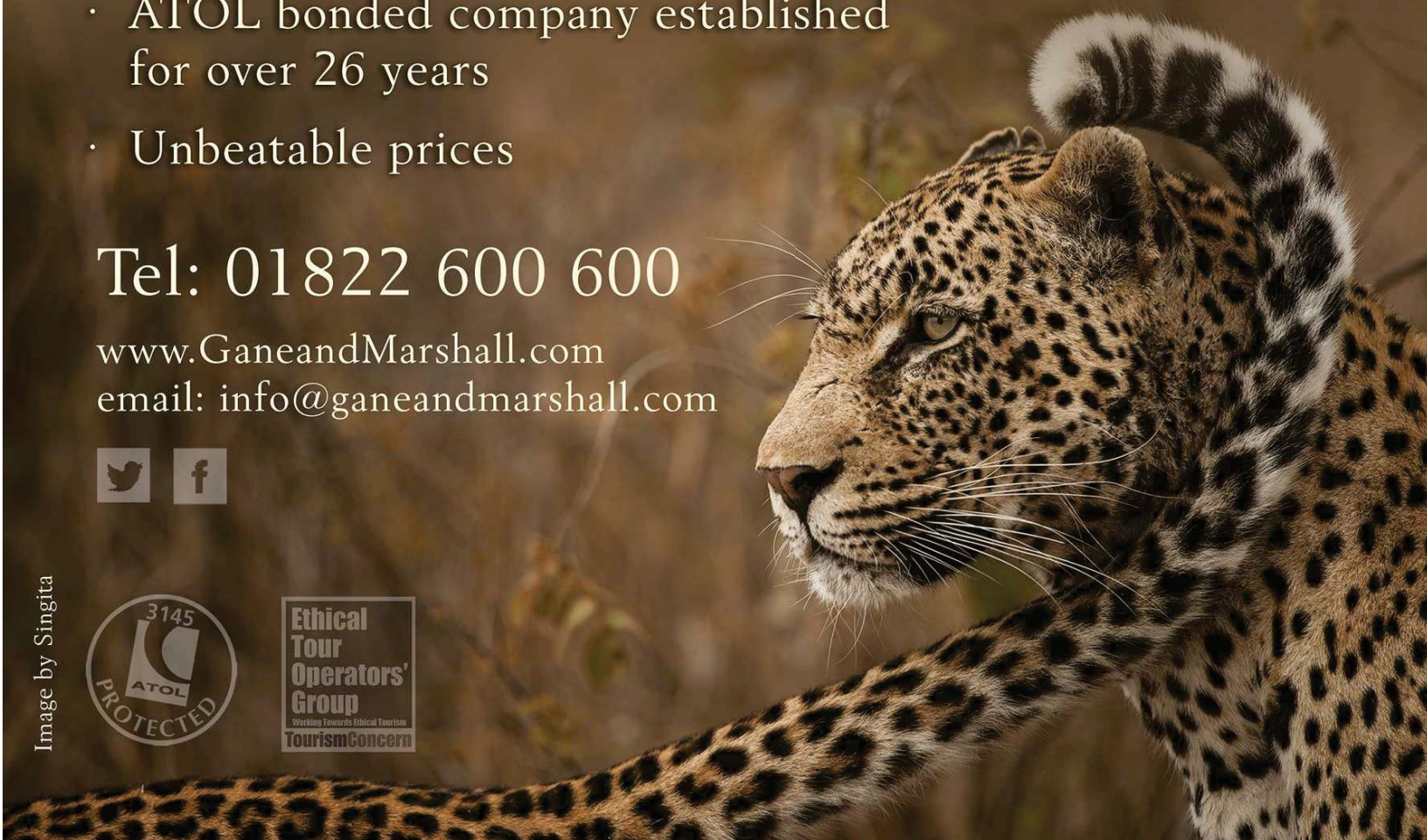

Image by Singita

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