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World of Animals

From the makers of
HOW IT WORKS™



WHAT ARE
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THINKING?

HOW EXPERTS UNDERSTAND ANIMAL BEHAVIOUR

DEADLY JELLYFISH
PUT ON TRIAL

UNCOVERING THE TRUTH BEHIND
THE REAL DANGER OF THEIR STING

SAVING SEA OTTERS

THE KING OF KELP NEEDS YOUR HELP

+
TOP
PHOTO TIPS
FROM THE
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PLUS
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CHIMPANZEES
CHINCHILLAS
POLAR BEARS



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Discover this beautiful
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SQUIRRELS

Get to know 6 of these
bushy-tailed rodents



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GREATEST
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Species that inspired
new technologies



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ISSUE 043

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World of Animals

Welcome



This month's cover animal, the sea otter, may be adorable, but there is a lot more to the ocean's smallest mammal than meets the eye. Yes, they are undeniably cute as they hold hands while

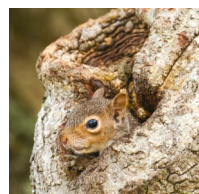
they sleep or carry their pups on their bellies to prevent them from drowning, but they are also vital to their ecosystem. The king of kelp's home wouldn't survive without it! Find out all about why we need to safeguard the future of the sea otter on page 12.

Also in this issue, find out which animals have inspired us to invent incredible new technologies (page 50), learn all about animal body language and how animal behaviourists have had to study and learn to interpret their every move (page 74), and find out if jellyfish really do live up to their deadly reputation (page 68).

We've also got some top tips from wildlife photography experts. Don't forget to send in your wildlife photos so we can see if you have the skills! Enjoy the issue!

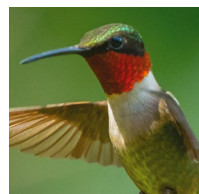
Zara Gaspar
Editor

Editor's picks



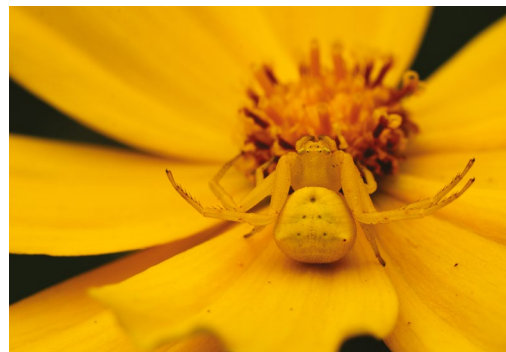
The wise old oak tree

World of Animals celebrates the amazing animals that inhabit Earth, but if it wasn't for the enriching habitats they call home, they wouldn't survive. Find out how the oak tree supports the creatures that rely on it on page 46.



Amazing architects

Hummingbirds are one my favourite birds, not only because they are beautiful, but because of their incredible abilities. Find out how the bird that can fly backwards builds the most intricate nests for its young on page 44.



Which animals are the masters of disguise? Find out on page 28

Visit www.animalanswers.co.uk for

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- Hilarious GIFs
- Upload your photos and win prizes!

Meet the team...



Designer

Lauren Debono-Elliott
The leaf-tailed gecko has to be my favourite animal in disguise. Spot the super smart animals undercover on page 28.



Production Editor

Charlie Ginger
I was amazed to learn that the dragonfly is the world's most successful hunter. Get ready to reassess this ruthless insect.



Picture Editor

Tim Hunt
Maybe think twice the next time you call all jellyfish deadly! See why some of these stingers have an unfair reputation on page 68.



Assistant Designer

Laurie Newman
From spotting elephant seal colonies to walking with guanacos, Argentina is incredibly diverse. Check it out on page 58.

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Welcome to Issue 43

06 Amazing animals

12 Saving sea otters

Why the king of kelp needs your help

20 All about dragonflies

Find out what makes these winged insects so incredible

28 Masters of disguise

See if you can spot these camouflage experts

34 Rhinos in numbers

Uncover the facts about these odd-toed ungulates

36 Ten of the tiniest animals on Earth

Meet some of the smallest creatures on the planet

44 Animal architects

Find out how the ruby-throated hummingbird builds its intricate nests

46 Wildlife of an oak tree

Discover the iconic tree that so many animals call home

50 Nature's greatest inventions

Meet the species that inspired new technologies

58 Explore the Earth: Argentina

From penguins to pumas, discover the wildlife gems of this beautiful country

66 Meet the squirrels

Get to know six members of the rodent family, famous for its bushy tail

68 Jellyfish on trial

Are these strange sea creatures as deadly as we think?

74 Animal body language

How to know what animals are really saying

81 Bizarre: stargazer

Meet one of the most venomous creatures in the ocean

82 Endangered: chinchilla

Ensuring this furry rodent doesn't go extinct

96 Lost forever: quinkana

Meet the crocodile's ferocious ancestor



THE IUCN RED LIST

Throughout *World of Animals* you will see symbols like the ones listed below. These are from the IUCN Red List of Threatened Species, the most comprehensive inventory of the global conservation status of animal species in the world. Here's what they mean:

- EX** EXTINCT
- EW** EXTINCT IN THE WILD
- CR** CRITICALLY ENDANGERED
- EN** ENDANGERED
- VU** VULNERABLE
- NT** NEAR THREATENED
- LC** LEAST CONCERN

44





12

SAVING SEA OTTERS



66



68



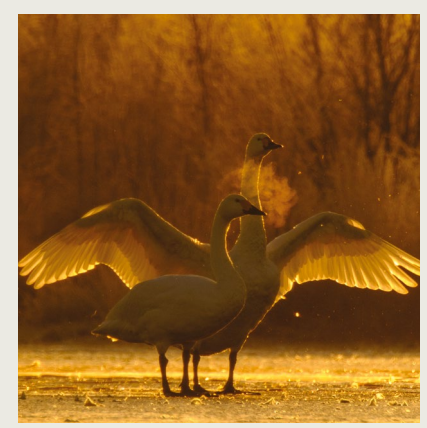
46



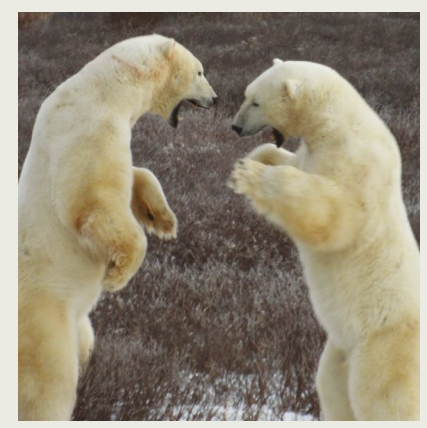
82

Your World of Animals

84 Shots with impact
Pro photographers tell us how you can get shots that stand out



90 Keeping in touch



94 Readers' Q&A



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Page 92

5





These red-sided garter snakes are battling the cold of their Canadian habitat by huddling together in a den and entering hibernation

Not all snakes hibernate: snakes in tropical climates will keep on slithering through the cold season as their prey remains abundant. However, snakes in colder climates need to preserve energy through a type of hibernation called brumation, which slows down metabolic processes. They will wake to drink, but don't need food for months.

© NaturePL/Huw Cordey

The amazing world of animals

© NaturePL/Orsolya Haarberg

While it might look like this stoat is performing a rather impressive, gravity-defying circus act by carrying two fish while walking upright, it is actually feeding off the fish as it hangs from a wire

The stoat – also named the short-tailed weasel – is a type of mustelid, and a relative of the otter, ferret and badger. This particular specimen is likely to be a northern stoat, which makes its home in Scandinavia and has a gorgeous white winter coat and a tawny-brown summer coat.





This veined octopus is truly coming out of its shell as it peeks out of the armour it's built for itself using items from the ocean floor of the Sulu-Sulawesi Seas in the central Indo-Pacific

It's good to know your weaknesses, but it's even better to find ingenious ways to cover them up! This octopus is also referred to as the coconut octopus, because it uses coconut shells and seashells to protect itself from danger. It's one of very few marine animals known to use tools.

The amazing world of animals

These baby opossums are having a great time hanging from a branch, showing-off their natural acrobatic skills

Opossums can hang from almost anything with their prehensile tails; particularly handy for their semiarboreal lifestyle. These cheeky marsupials have a clever trick for staying alive: playing dead. This defence mechanism is involuntary, like fainting, and includes method acting tactics like the excretion of foul odours from the anal glands.





SAVING SEA OTTERS

Words **Ella Carter**

They're super cute, super fluffy and they even hold hands while they're asleep. Adorable right? However, these critters have had a rough ride. Read on to learn their amazing story

SEA OTTER

Enhydra lutris

Class Mammalia



Territory Pacific coastlines

Diet Fish, crabs, clams, starfish and sea urchins

Lifespan 20 years

Adult weight 22-45kg (49-99.2lb)

Conservation status



ENDANGERED

Sea otters are the ocean's smallest mammal. They can spend their entire lives in the water above giant kelp forests, for which they are a keystone species. Without the otters' influence the kelp forests would not survive.

The key to this is the sea otter's appetite. With small bodies and no blubber they are constantly burning energy to stay warm, which means they need to feed a lot. They spend half their day hunting, using their flat, paddle-like hind legs to dive to the seabed to fetch sea urchins, crabs and starfish, which they eat at the surface.

The otters also eat the kelp's nemesis: the hungry herbivore grazers, so the forest (and the life that relies on it) can flourish. But if the otters were to disappear, so would the kelp, irreparably damaging the ecosystem.

Another trick sea otters have to keep warm is their amazing fur. Two layers work together to trap air close to the skin and keep the otters snug. Fur needs a regular fluffing up to ensure enough air is trapped, and so this is why if an otter isn't eating, it's probably grooming. Sadly though, this fur has also been the cause of their downfall. In the late 19th century sea otters were hunted almost to extinction for their highly valuable pelts.

Gathering in enormous congregations known as 'rafts', sea otters are very social creatures. Males and females typically stay apart, so the large groups of otters that can be seen (if you're really lucky) on Pacific coastlines will all be the same gender. Then, of course, there is their incredibly cuddly offspring.

BELOW Sea otters rarely venture further than about 1km (0.6mi) from the coastline

"In the late 19th century sea otters were hunted almost to extinction for their highly valuable pelts"



Saving sea otters

Growing up

Life as an otter pup is hard, but the babies get to catch a lift with mum before it's time to learn life's lessons

Otter pups are born throughout the year. They come into the world with their eyes open, with ten sharp teeth and with a fluffy, super-buoyant coat of fur. This traps so much air that the babies bob like a cork on the water's surface - they don't need to learn to swim straight away.

Pups spend a few months hitching a ride on mum, and are born with a typical sea otter's giant appetite, so this means the female has to eat as much as she can to sustain the pup's demand for milk.

When it's time to hunt, the mother otter will either wrap her pup in kelp to anchor it in one spot or haul it out onto rocks (or even the swim deck of boats in harbour areas) to keep it safe while she looks for food.

The pups shed their baby fur at around 13 weeks old, and they are fully independent between six and 12 months old. They learn everything from their mothers, such as how to find the best clams and how to crack shells on rocks to get to the meal inside it.

RIGHT Otters will smash their prey against rocks, or use small stones to crack open shells to get to the tasty morsels within



Three things we love about sea otters

They hold 'hands'! Otters link paws, creating a raft which prevents them from drifting while they relax in the water.

Their amazing fur is so dense they have 150,000 hairs per square centimetre (1 million per square inch) - more than we have on our entire heads!

Otters are very clever animals. They can devise solutions to problems (like opening shells) and pass this on to their young.

The Otter Project

The Otter Project is a group of scientists and conservationists who are championing the otters' survival, one cause at a time. Since their creation they have achieved many landmark rulings for otters, tackling issues such as water quality and pollution, protecting Marine Protected Areas (MPAs) and also using scientific literature and data to monitor environmental factors like the effects of offshore oil drilling, spill response and shipping traffic. All of these factors and more contribute to the prevalence of the sea otter species.

Some of the main achievements of The Otter Project include the abolishment of 'no otter zones', which were set up by the fishing and oil industries, as it was thought that the presence of otters would have a negative effect on these industries. The Otter Project and its supporters managed to get the US Fish and Wildlife Service to re-evaluate the effectiveness of the area, which ended up with the 'no otter zone' being abolished, affording otters the protection they deserve.

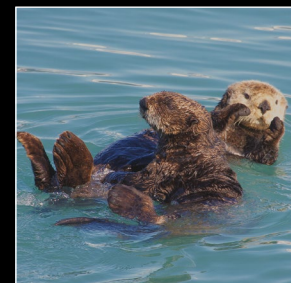
"The group managed to get 'no otter zones' abolished"



In 2004 the group successfully opposed the development of 36 offshore oil leases

Sea otter species

There are three distinct subspecies of these cute marine mammals, defined by the location of their home



Northern sea otter

Enhydra lutris kenyoni

These otters are slightly larger than their counterparts, and as their name suggests, they hail from northern territories. Their range extends from the Aleutian Islands to Prince William Sound in Alaska, US, progressing along the Pacific coast of Canada and then with small populations extending into Oregon, US.



Southern sea otter

Enhydra lutris nereis

Southern sea otters (also known as California sea otters) are only found along the Californian coastline. They are slightly smaller in size compared to the northern subspecies, growing to around 1.2 metres (four feet) in length, and range from San Mateo County in the north to Santa Barbara County in the south.



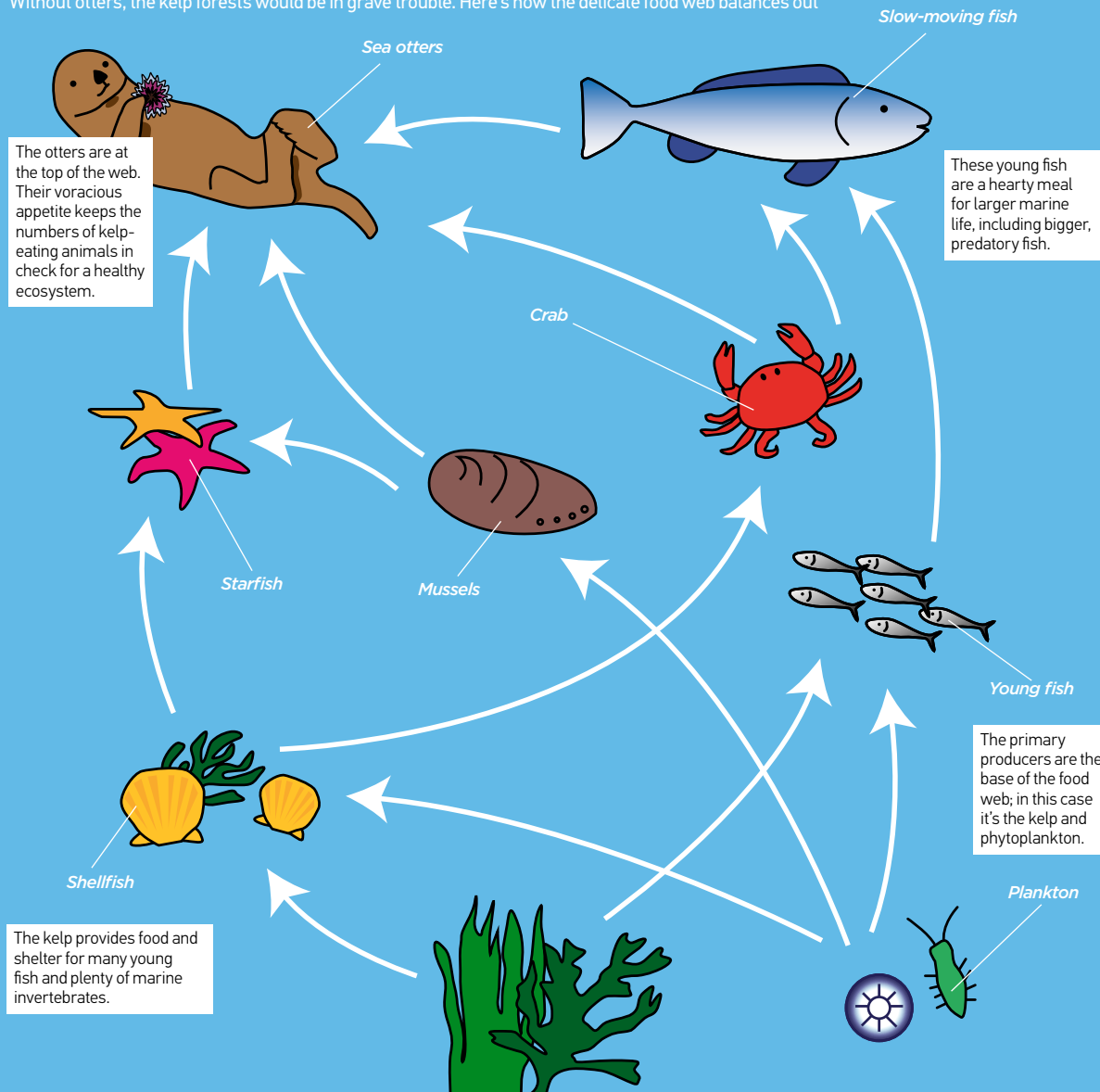
Common sea otter

Enhydra lutris lutris

This otter subspecies is mostly found in Asian waters, historically hailing from the coastal regions of Japan up to the Commander Islands in the Bering Sea. They are very like their southern and northern cousins, feeding on sea urchins and crustaceans and keeping the kelp beds healthy.

The kelp ecosystem

Without otters, the kelp forests would be in grave trouble. Here's how the delicate food web balances out



The sea otter's comeback

Devoted conservation programmes have brought sea otters back to Pacific shorelines

Thanks to their amazingly dense fur – the thickest pelt of any mammal – sea otters were a very desirable target for fur trappers in the 18th and 19th century, prized for softness and warmth. Otters were hunted in their thousands and their skins shipped off to be made into coats and hats.

In just a few centuries the fur trade decimated the once healthy population, reducing it to just 13 small groups, with just

one raft of 32 animals existing in California. Thankfully, legislation was eventually passed in order to protect sea otters by way of the International Fur Seal Treaty in 1911 and the Marine Mammal Protection and Endangered Species Acts in the 1970s.

Despite the threats that sea otters still face, populations are now rising thanks to conservation efforts. Monitoring populations and habitats, and implementing a rescue,

rehabilitation and translocation programme, have secured sea otter populations.

Fostering schemes are particularly successful, where southern sea otter babies are placed with surrogate mothers in captivity. The captive female teaches her adopted pup how to swim, dive and feed. Pups have no human contact (carers even cover their faces when interacting with them) to ensure that the little otters have the best chance of survival in the ocean.

Threats

Sea otters are threatened by oil spills. The oil mats their fur, so it can't insulate them and the otters perish from hypothermia. The Exxon Valdez disaster in 1989 killed several thousand in this way.

Runoff water containing agricultural fertilisers from land can cause blooms of harmful algae on the sea surface. These can produce toxins that otters ingest, potentially leading to sickness and even death.

Pollutants and parasites from land pose a risk to sea otters. Parasites usually found in cats and opossums can cause disease. In California this is responsible for 40 per cent of otter deaths.

Sea otters eat shellfish that are also commercially fished, unfortunately putting them in competition with human fishermen. Otters can get tangled in fishing gear or hit by the increasing boat traffic.

Shrinking sea otters



Once present throughout coastal areas of the Pacific from Japan to Mexico (historical range in red), sea otter populations are now limited to specific locales, as noted in yellow on this map.

● Historic population range
● Current population range

Otters are expert divers with a large lung capacity for their small size, allowing them to forage underwater for up to five minutes per dive



Saving sea otters



Sea otters constantly groom themselves to trap more air in their dense fur, helping them to keep warm in the chilly sea

You otter help out

Preventing the sea otter's extinction is a task we can all get involved in

While it's tempting to think that only the large conservation organisations and charities can engineer change, we must all do what we can to save these beautiful creatures.

Simple steps, such as ensuring that you purchase sustainable, biodegradable goods and recycle as much as possible all contribute. Using less water, cleaning with nontoxic household products and checking your car isn't leaking oil are also ways you can help.

For the more intrepid animal lovers, volunteering to clean up a beach or adopting a sea otter are both hands-on approaches to making this mammal's future that bit safer. Remember, doing something small is better than nothing at all.



Otter protectors

Dedicated conservation organisations have played an intrinsic part in the story of sea otter survival



Monterey Bay Aquarium

The aquarium's Sea Otter Program aims to understand the sea otter population and learn more about the way the otters live. The aquarium also rescues injured and sick otters and rehabilitates them for release in the wild, as well as fostering babies and finding homes for otters that need to stay in captivity.



The Marine Mammal Center

A nonprofit veterinary research clinic dedicated to researching and preserving the lives of marine mammals, the sea otter visitors of the Marine Mammal Center in California have been treated there since 1995. Since then, over 200 of these furry little individuals have been rescued and rehabilitated.



Sea Otter Foundation & Trust

SOFT helps sea otters by raising awareness and educating people about the marine critters, as well as providing funding for charities and projects across the sea otters' range, so that scientists and conservationists can keep protecting these creatures. They also raise funds by running an 'adopt an otter' scheme!

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All about dragonflies





All About dragonflies

Armoured bodies, sophisticated wings, startling colours and a huge predatory appetite: dragonflies are not your average pond life. Prepare to take off with the ultimate insect predator

Words **Ella Carter**

SOUTHERN HAWKER DRAGONFLY

Aeshna cyanea

Class Insecta



Territory Europe

Diet Various insects, including other dragonflies

Lifespan 2–3 years

Adult weight 0.4g (0.01oz)

Conservation Status



LEAST CONCERN

All About dragonflies

Dragonfly life

What does it take to survive in the harsh insect world?

Dragonflies are best known for their amazing colours and their incredible flying speed. If you're lucky enough to see one, it'll only stay still for a few seconds. It's a method that has worked for these insects for over 300 million years, as dragonflies evolved even before the dinosaurs. Fossil records show that some ancestral species of these ancient insects had wingspans of over 70 centimetres (two feet), claiming the title of the largest insect ever.

Today, there are more than 5,000 species of dragonfly worldwide, but just 36 are in the UK. The largest species is the hawker dragonfly of the genus *Aeshna*. These beasts have long tapered abdomens with a strong and muscular thorax and sport some flashy colouring.

The southern hawker dragonfly can be found flying around heathland and woodlands, particularly in the south of the UK. It is mostly black, but has spots of shocking lime green along its long body to complement its highly sensitive blue-green eyes.

As with many dragonfly species across the globe, the males of this variety are much more pigmented and vibrant than the females – this is to show off when it's mating season! Southern hawkers reach their adult stages in the warmer months between June and September every year, and the territorial males will show off their impressive tints to any would-be challengers at the water's edge.

When it comes to a mid-air dragonfly dogfight, the contenders have one extra party trick. These insects are able to utilise in-air camouflage to outwit opponents and assailants, and most of all, to sneak up on prey.

They do this by constantly adjusting their position so that they always occupy the same spot in the prey's retina – making them look stationary while they are actually moving in for the perfect stealth attack. Even if their target realises the danger they are in, it's often too late. Some dragonfly species have been known to take down prey as large as hummingbirds!

However, despite amazing flying and hunting abilities, the bright colours of dragonflies can also draw unwanted advances from predators. As a big insect they are a hearty meal for the fastest hunters. Birds such as kestrels and swallows have been known to hunt down a dragonfly, as well as some plucky fish species that leap out of the water to snatch a dragonfly that strays too close to the surface.

The larval stages of dragonflies are almost always lived out in freshwater ponds and lakes, where they hunt constantly, using their eyes as their secret weapon. But in true dragonfly style, there are exceptions to the rule.

Very few insects are able to live in the ocean, but the coastal dragonfly species known as the seaside dragonlet is one of them. This dragonfly prefers seawater and salt marshes, and is able to lay its eggs in salty, brackish water.

Dragonflies are truly incredible insects, so read on to discover more about these ancient and aerodynamic bugs.

Dragonfly behaviour

These animals lead very interesting lives. Here are just a few key things to admire about these ruthless hunters



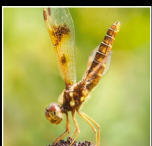
Larval stage

Dragonflies spend most of their lives as aquatic larvae. They hatch from eggs laid in vegetation or dead wood and live and grow in still, freshwater ponds or marshes. Even as larvae they are skilled predators, feeding on other larvae insects and worms.



Metamorphosis

To begin the transition to adulthood, a larva climbs out of the water and breathes air. The hard exoskeleton then cracks open and the adult dragonfly emerges. The insect needs to take its time though, waiting for its new body to harden before taking flight.



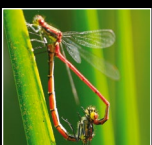
Temperature regulation

Adult dragonflies can maintain their internal body temperature by shivering wings, hunting, and basking in the sun. To cool down, dragonflies will seek shade, be less active and use the 'obelisk position', pointing its long abdomen into the air.



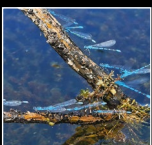
Dragonfly migration

A small number of species are migratory and can cover huge distances. The 'globe skimmer' species (*Pantala flavescens*) holds the record for the longest insect migration, travelling 14,000-18,000km (8,700-11,186mi) between India and Africa.



Territorial behaviour

Adult dragonflies return to mate near water, and some males will battle to defend their patch. Any female is a potential mate. Dragonfly mating is unique: when a couple are 'in tandem' they complete a wheel or heart-like shape to transfer sperm.



Swarming groups

There are two types of dragonfly swarms: feeding and migration. Feeding swarms can consist of different species, congregating quite close to the ground or water. Migration swarms fly higher, and usually a single species makes the journey.

Found throughout the UK, the southern hawker is a large and highly territorial dragonfly species



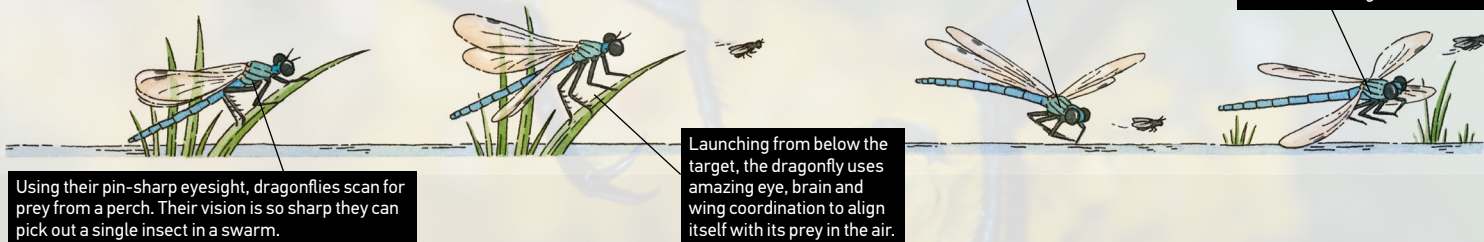


Skilled hunter

As one of the world's most voracious predators (yes, really) dragonflies have one of the most effective hunting strategies in the animal kingdom

Some species can hunt at speeds of around 48kph (30mph). They rush their prey with a surprise attack and have a success rate of 90-95 per cent.

As prey is seized, the dragonfly uses its legs to form a 'basket' to ensure it can't escape. The dragonfly will eat in mid-air before restarting the chase.



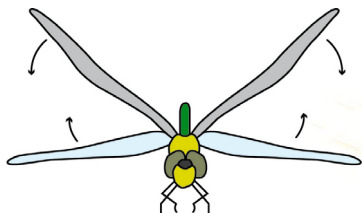
Using their pin-sharp eyesight, dragonflies scan for prey from a perch. Their vision is so sharp they can pick out a single insect in a swarm.

Launching from below the target, the dragonfly uses amazing eye, brain and wing coordination to align itself with its prey in the air.

Built for speed

The dragonfly is an aerodynamic missile of an insect. Long and slender, with amazingly developed eyes, it's no wonder that these ancient flying torpedoes are such successful predators. Take a peek at the inside of these critters

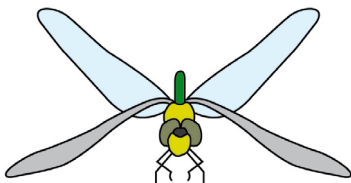
How dragonfly wings work



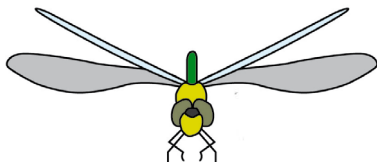
Each wing operates independently in each direction and there is a phase difference between the two pairs – they flap to different rhythms.



Moving the wing pairs in such a way allows a huge array of movement – dragonflies can fly forwards, backwards, up, down, hover and also glide.



Each wing has elevator and depressor muscles attached to it directly. To go forwards, the front wings provide lift, while the back set provide the thrust required.



By adjusting their wing orientation, dragonflies can alter the aerodynamic forces acting on their wings. This gives the insects incredible control over their flight.

Hindwings

Forewings

Aorta

Heart

Mouth

Dragonflies belong to the order Odonata, Greek for 'toothed ones'. Their mouthparts are incredibly strong, with serrated parts of their mandibles that they use like teeth to cut through prey.

Salivary glands

INFANCY

Eggs hatch 0 hours

Eggs hatch in the aquatic vegetation where they were laid. Larvae straight from the egg have a tadpole-like body shape.

First moult 2-3 hours

Larvae grow quickly. They shed their first exoskeleton within a few hours and begin to grow.

Hunting 1 day

A larva will begin to hunt at once. Even as juveniles they are voracious predators and will hunt on their own and catch prey.

JUVENILE

Larval moults Up to 2 years

The larva moults up to 15 times and will spend anything from a few months to a few years in the water.

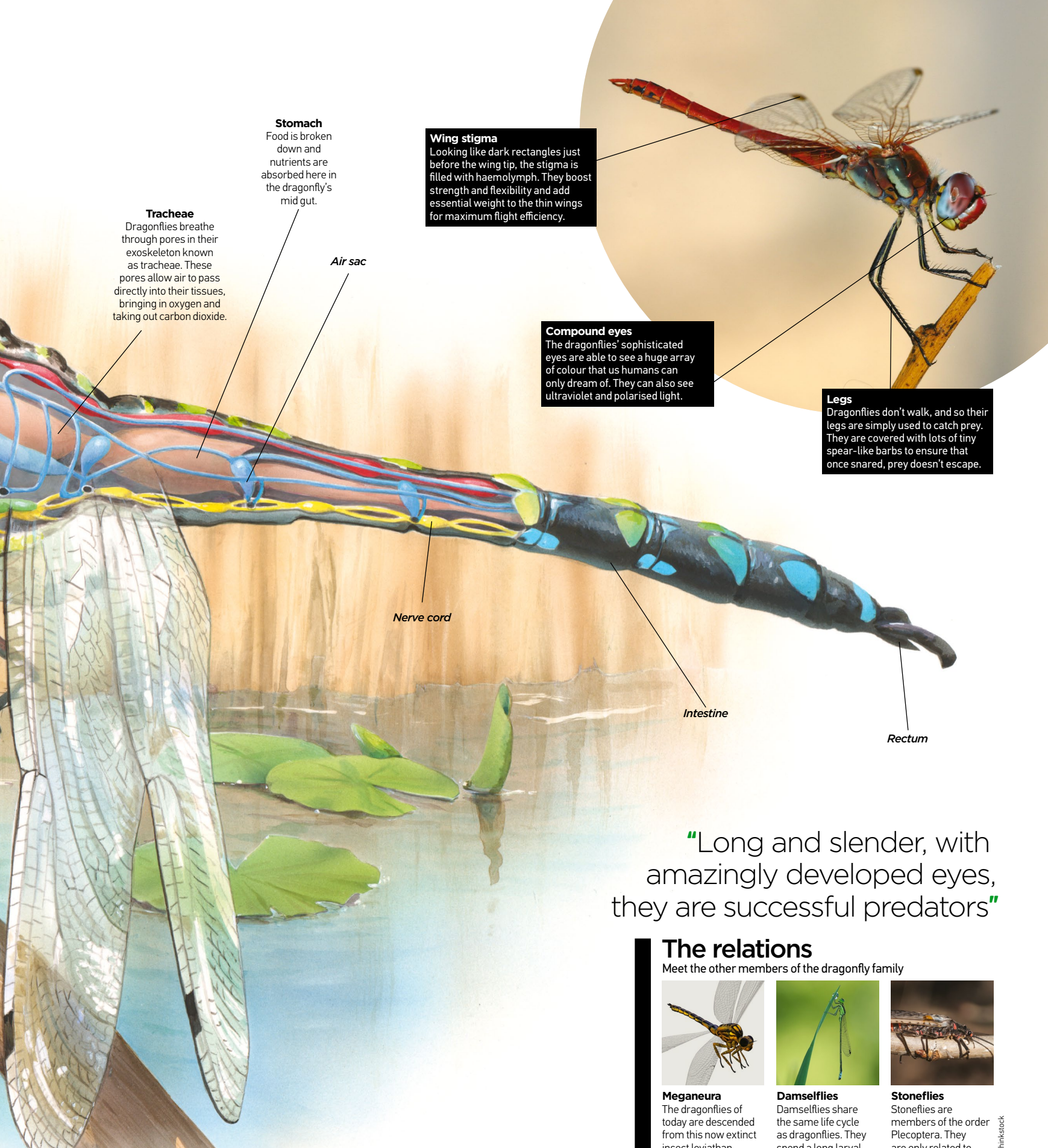
ADULTHOOD

Metamorphosis 2-3 years

The larva leaves the water to undergo its final moult. It sheds another exoskeleton to reveal its adult form.

Adulthood 2-3 years

Depending on the species, adults spend less time as a fully developed dragonfly than as a larva, sometimes lasting just a few months.



Tracheae

Dragonflies breathe through pores in their exoskeleton known as tracheae. These pores allow air to pass directly into their tissues, bringing in oxygen and taking out carbon dioxide.

Stomach
Food is broken down and nutrients are absorbed here in the dragonfly's mid gut.

Air sac

Wing stigma

Looking like dark rectangles just before the wing tip, the stigma is filled with haemolymph. They boost strength and flexibility and add essential weight to the thin wings for maximum flight efficiency.

Compound eyes

The dragonflies' sophisticated eyes are able to see a huge array of colour that us humans can only dream of. They can also see ultraviolet and polarised light.

Legs

Dragonflies don't walk, and so their legs are simply used to catch prey. They are covered with lots of tiny spear-like barbs to ensure that once snared, prey doesn't escape.

Nerve cord

Intestine

Rectum

“Long and slender, with amazingly developed eyes, they are successful predators”

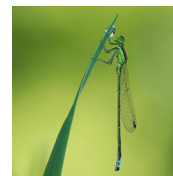
The relations

Meet the other members of the dragonfly family



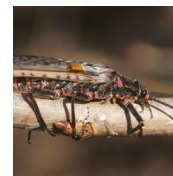
Meganeura

The dragonflies of today are descended from this now extinct insect leviathan. With a wingspan just under 0.8 metres (2.6 feet) this prehistoric predator would have been capable of feeding on small reptiles and amphibians.



Damselflies

Damselflies share the same life cycle as dragonflies. They spend a long larval stage underwater before emerging as adults for a short period in the air during the spring and summer months. They are also members of the order Odonata.



Stoneflies

Stoneflies are members of the order Plecoptera. They are only related to dragonflies in the fact that they belong to the subclass Pterygota, which includes the winged insects, but they do share the same habitat and a very similar life cycle.

Teneral stage 2-3 years

Adult dragonflies need to mature before they are able to reproduce, so they spend much of this time hunting and feeding.

Mating 2-3 years

After feeding for around a week, the dragonflies reach sexual maturity and head back to the water in search of a mate.

Laying eggs 2-3 years

The males guard their mates to ensure a rival does not reproduce with them. Females lay eggs either in vegetation or in the water, then the cycle starts again.

Dragonfly habitat

Welcome to the wetlands – the ponds, lakes and rivers that make up dragonfly country

Dragonflies enjoy habitats that have shallow, slow running fresh water and plenty of aquatic plants. Ponds, lakes, canals and marshlands are all perfect environments for British dragonfly species as they have a huge abundance of fauna for the larvae to hide in beneath the water surface, which they will then climb up when it's time to emerge as a majestic adult.

There are different species that prefer different chemical properties. For example, the azure hawker can be found buzzing near peat bogs due to the acidity of the environment. Dragonflies (both adult and larva) can tolerate a small level of pollution in the water, but contamination levels are becoming an issue for British species.

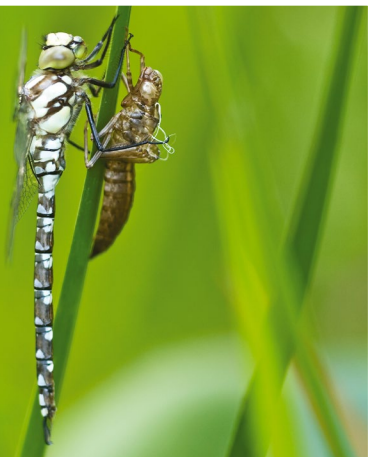
A survey by the British Dragonfly Society indicated that 39 per cent of species were in decline. An increase of agriculture, changes in land management, and urban and industrial development can all decrease the quality of water for dragonflies and their freshwater neighbours. Similarly, overstocking of ponds, livestock and also the damming of rivers and waterways can have a catastrophic effect on populations.

Dragonflies can help to indicate the health of an aquatic habitat and are a vital link in the food chain. But rising temperatures are luring southern species ever further north, adding too much competition for the resident dragonflies and putting even more pressure on fragile ecosystems.

Dragonflies are considered a delicacy in parts of Asia, and can be eaten fried or grilled on a barbecue

Dragonflies need pools of still, fresh water, so the best way that you can help these insects is to have a pond in your garden. Build your pond with shallow edges and introduce plenty of water plants – dragonfly larvae love places to hide and adults need places to safely lay their eggs.

The two life stages of dragonflies both centre around still, freshwater habitats like ponds and lakes



Dragonflies and humans

You may be surprised by the effect that these insects have on our everyday lives

Dragonflies are beautiful to look at, but have you ever thought about what they do for us? First of all, it's worth noting that they control the insect population. Their insatiable and highly successful predation of airborne bugs like flies, midges and mosquitoes means that there are far less in the air to buzz around us, to bite us and to spread diseases.

Dragonflies are also excellent news for gardeners as they munch on common garden pests like aphids. There's never been a better time to check which dragonfly species live in your area and find a way to tempt them to your garden pond.

Everyday bug eating aside, dragonflies have also been the incredible inspiration for a huge amount of technology. The aerodynamics of their wings and the amazingly complex way that they move them to achieve such exquisite flight has been the focus of much scientific study, and there have been numerous robots and drones designed and produced that mimic their flight.

The Ministry of Defence is one such organisation that is looking into dragonfly-inspired tech. Small drones called 'skeeters' are currently in development, equipped with flapping wings just like the insects themselves. These drones are designed for intelligence and reconnaissance missions: to go into environments that other drones can't. Carrying surveillance equipment, weighing less than two pound coins and capable of speeds up to 74 kilometres per hour (46 miles per hour), these drones are super high-tech – but still not quite as good as the real thing!

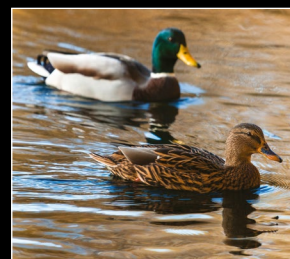
Nearest neighbours

The animals that share the dragonflies' wetland home



Bass

These large freshwater fish often stay near the surface of ponds during the few months of the year when adult dragonflies are flying topside. They are adept at snatching up any insects hovering over the water.



Mallard duck

Widespread across the UK, these ducks share the dragonflies' watery neighbourhood. They paddle across ponds, regularly dipping their heads into the water for a snack, which may be a dragonfly larva if they're lucky.




Water shrew

Found living in burrows on the banks of reed beds, ponds and streams, water shrews hunt underwater for insects and larvae. These solitary creatures have the unusual mammalian trait of venomous saliva.



Water beetle

Water beetles live in freshwater systems like ponds, canals and rivers across the country. There are many different types and most have a larval stage, but unlike the dragonfly the adult phase also occurs in the water.



MASTERS OF DISGUISE

20/20 vision is irrelevant when it comes to finding these clever creatures. These animals have worked out sneaky ways to remain undercover and keep out of sight

Words **Laurie Newman**

**The spider that sits
in disguise waiting
to pounce on its
unsuspecting prey**

Unlike most arachnids, the goldenrod crab spider does not use a web to catch prey. Instead, it captures any passing insects by patiently perching on top of flowers with its pincers at the ready, using its careful camouflage to blend in. By actively changing their body colour from white to yellow depending on the flower they are resting on, they are able to remain invisible to their prey, which often means a successful hunt.

The gecko that blends into trees

The mottled colours and the leaf-fringed tail make it incredibly difficult to spot the Henkel's leaf-tailed gecko. And if a predator is fortunate enough to spot this reptile in its habitat, the gecko has one more trick up its sleeve: tail shedding. The gecko can detach its tail from its body when captured, allowing it to escape predators safely and avoid becoming a reptilian snack.

A close-up photograph of a brick moth (Agrotis sepioides) resting on a large, brown, dried oak leaf. The moth's wings are a warm terracotta or brick-red color, adorned with a pattern of dark brown and black spots and lines. The leaf it sits on is a similar brown hue, with prominent veins and some darker spots, providing excellent camouflage. In the background, other autumn leaves in shades of red and orange are visible, along with a patch of green moss at the bottom. On the far left, a vertical strip of grey, textured bark is partially visible.

Masters of disguise

The disguised moth that flies at night

Named for its terracotta features, the brick moth is often found hiding among woodlands and in parks. They emerge during autumnal months and are distributed across most of the UK. Look out for them resting on leaves, in particular when feeding on poplar trees, a favourite food source.

© NaturePL/Bernard Castelain, NaturePL/Robert Thompson

Masters of disguise

The savvy frog that will change colour to avoid ending up on the menu

As its name suggests, the European edible frog is widely hunted for human consumption, most commonly for the European delicacy of frogs legs. On hearing approaching predators these amphibians blend in by matching their colours to their surroundings, or by hopping into a nearby pond.



The flatfish that spends its day buried beneath the sand

The European plaice disguises itself underwater using the clever technique of mimesis. By using its fins to cover itself in sand, this fish can blend in with the seabed, aided by the small orange spots on the top of its body. It will then often remain still for long periods of time, becoming active at night when it feeds on molluscs, worms and crustaceans.

In numbers...

Rhinos in numbers

How fast can a rhino run? How long is that famous horn? And why is the once strong global population fading so fast?

Poachers, agricultural production and political conflict are all just some of the threats to the rhino species that is dying rapidly. However, the desire to protect these magnificent creatures from extinction is becoming stronger, and conservation work is ongoing in an effort to increase the rhino's chance of survival.

Targeted for their horns, the very nature of the illegal trade at present is being debated after South Africa lifted the ban on the commerce, which had

been in place for 40 years. Some experts argue that a blanket legalisation of the horn market may aid the rhino population and prevent them being so brutally killed.

Efforts are being made to prevent a repeat of the 2011 declaration of extinction on Vietnamese Javan rhinos, the subspecies wiped out entirely due to poaching. Even so, these tank-like animals face an uncertain future. The total number left in the wild is a mere fraction of what it was in the early 20th century.



The race to save the rhino

As the world confronts the prospect of losing these iconic animals, we talk to Chessington Zoo about their role in the fight for the rhino's revival

Why is the work carried out by Dambari so important to the rhino population?

As rhinos are hugely at risk from the poaching crisis in Zimbabwe, the Dambari Wildlife Trust was set up ten years ago and supports and monitors the white rhino population in Matobos National Park and the black rhino population in Sinamatella in Hwange National Park.

Dambari monitor the rhino population with patrols and camera traps, and identify each rhino in the National Park. Any missing rhinos are searched for in case they have been poached, and where necessary anti-poaching patrol routes are changed, increased security added or broken fence trips fixed. On my visit in October 2016, the rhinos were being de-horned to discourage the poachers.

How did the opportunity for a partnership arise between Chessington Zoo and Dambari?

It was a worthwhile cause that Chessington World of Adventures Resort wanted to support in conjunction with us

housing rhinos here. It was a great way for us to educate visitors on the plight of these animals in the wild.

What is being done at Chessington to aid their work in Zimbabwe?

We raise money within the park for our very own conservation fund (the Chessington Conservation Fund), which supports Dambari, as well as other conservation charities.

Money is raised in various ways, from a percentage of our car parking fee going towards the fund or staff members doing sponsored activities such as parachute jumps. We even have a whole evening event dedicated to the fund each year called Roar & Explore. This money is then used to purchase anti-poaching and rhino monitoring equipment such as a land rover, binoculars and rhino identification cards, as well as supporting education programmes within Zimbabwe.

For more information about the Chessington Conservation Fund visit www.chessington.com.

"We raise funds that are used to purchase land rovers, binoculars and rhino identification cards"

Beneath the armour

The fascinating figures behind these big-hearted beasts

50

Depending on the species, rhinos can live up to around 50 years in the wild.

50%

Percentage of male black rhinos that die as a result of fighting with rivals.

50

Once the largest land animal, the rhino has been around for over 50 million years.

48-55kph

A rhino's top speed will depend largely on its size, stature and agility.

3M

Length of the smallest species, the Sumatran rhino, from hoof to shoulder.

16

months
The average length of a rhino's pregnancy, one of nature's longest.

77 YEARS

In 2014, rhino poacher Mandla Chauke received one of the longest prison sentences for his crimes.

\$60,000

The average value per kilogram of a single rhino horn according to 2014 figures.

**Greater one horned rhino**

3,500+ left
Vulnerable

**Javan rhino**

61 left
Critically endangered

**Sumatran rhino**

<100 left
Critically endangered

**Black rhino**

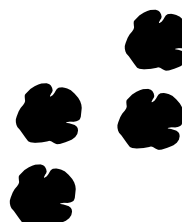
5,455 left
Critically Endangered

**White rhino**

21,077 left
Near Threatened

5

There are just five species of rhinos in the world: white, black, greater one-horned, Sumatran and Javan.



Known as odd toed ungulates, the rhino has three toes on each foot. Similar ungulates include zebras.

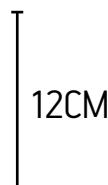


4,843

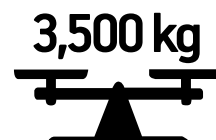
Number of rhinos poached in the last six years. Numbers have almost quadrupled since 2010.



The length of one of the longest recorded rhino horns ever found measured 36cm (14in) and belonged to a rhino from the Bagori range of Kaziranga National Park.



The length a rhino's horn can grow in a single year. If the horn is removed, it can grow back to nearly full size in three years.



3,500 kg

A white rhino can weigh up to 3,500kg (7,716lb) as an adult. By comparison, Sumatran rhinos weigh up to 960kg.

70%

Percentage of the world's rhinos that can be found in South Africa.

200

The amount of plant species a rhino eats. They also eat fruit.

1,175

Number of rhinos poached in South Africa in 2015, 40 less than in 2014.

20-25cm

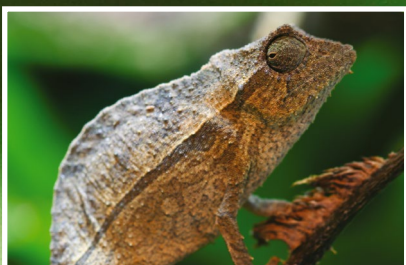
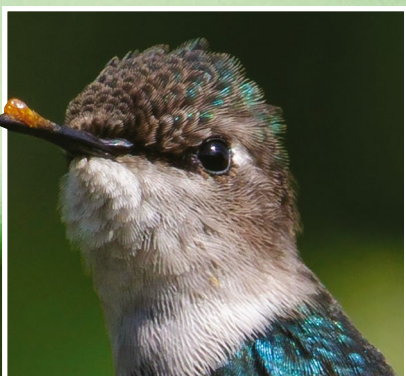
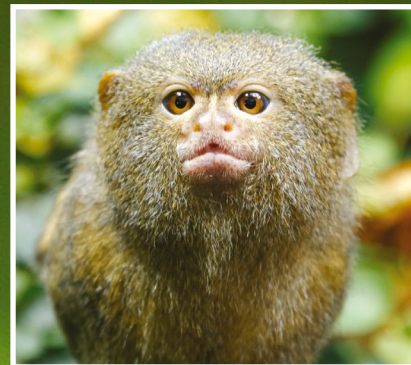
This is the average width of an adult black rhino's footprint.

WIN a chance to put a rhino to bed

Ever fancied putting a rhino to bed? Well Rhino Snores at Chessington Zoo gives you the opportunity to prepare their rhinos for bedtime. You'll meet the zoo's specialist rhino keeper, who will guide you through the preparations for making a comfortable night's sleep.

Help the keepers call in the rhinos, and get up close to these magnificent creatures to prepare their feed for the night.

For full details and a chance to win visit www.animalanswers.co.uk



10 OF THE TINIEST ANIMALS ON EARTH

Words **Matt Ayres**

From midget monkeys to insect-sized birds and critters so small they were only discovered in the last decade, meet the smallest animals on the planet

The wild, untamed world of nature often conjures images of hulking elephants roaming the plains of Africa, lions stalking their prey, and titanic whales cruising the oceans. But what about the fascinating little creatures that live alongside the giants of our planet?

From minuscule mammals that could sit on your finger, to lizards and seahorses small enough to fit on a coin, Earth is dominated by super small species. Welcome to a world that proves size really isn't everything.

The tiny monkey that fights for a meal

The pygmy marmoset is the world's smallest monkey. Found in the rainforests of the Amazon basin, these little critters will fight each other over trees in order to reach their favourite food: tree sap.

Despite its small stature, the pygmy marmoset isn't lacking in clever adaptations for arboreal life. They can rotate their heads 180 degrees to look for danger, cling to branches with specialised claw-like nails, and leap 4.5 metres (15 feet) between trees.

Sadly, these incredibly cute primates are targeted by the pet trade, which is severely threatening the survival of wild populations and therefore the future of the species.



Size: 152 mm (6in)

Comparison: The size of an index finger

Brookesia micra was discovered in 2012, alongside several other small chameleon species

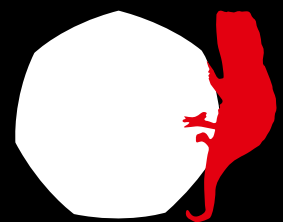


A chameleon that can sit on a 50p

Brookesia micra is found on the island of Nosy Hara in Madagascar, and is the smallest species of chameleon.

These minuscule lizards spend most of their day hiding in leaf litter, before emerging to climb into the trees at night to find a safe place for a snooze away from any predators below.

It's thought that the reason for *Brookesia micras*' tiny stature could be due to a natural phenomenon known as insular dwarfism – a process in which a species gradually reduces in size over generations due to a habitat that's limited in space. Small islands such as Nosy Hara are a prime example.



Size: 29mm (1.1in)

Comparison: Size of a 50p coin

10 of the tiniest animals on Earth

Cuba's native hummingbird

The bee hummingbird is a living example of the phrase 'small but perfectly formed'. These tiny creatures are the smallest birds in the world, yet their anatomies are a stunning spectacle. Males are a striking emerald green with scarlet throats, while females flaunt mesmerising speckled blueish-green feathers and a white breast. Their feathers are iridescent, making these miniature birds sparkle like jewels when they are viewed from certain angles.

Although they're a bit larger than their namesakes, bee hummingbirds do share the bee's love of nectar. They move their tongues rapidly in and out of their beaks while hovering near flowers, visiting as many as 1,500 plants per day to feed on the sweet, sticky liquid inside them. Pollen sticks to the hummingbird's head while it feeds, so these little birds also play an important role in pollination.

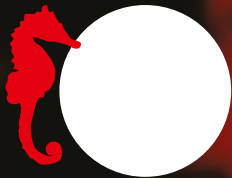


Size: 60mm (2.4in)

Comparison: The size of a golf tee



"They visit as many as 1,500 plants per day to feed on sweet nectar"



Size: 24mm (0.9in)

Comparison: Size of a 2p coin

The colour-changing seahorse

As well as being home to the world's largest animals, the ocean is also where some of the smallest creatures on our planet dwell. Take the Denise's pygmy seahorse, for example: a diminutive fish that hides in clusters of coral-like organisms called gorgonians.

This seahorse is a master of camouflage – it is able to change the colour of its body to match its surroundings, and the small tubercles on its body closely resemble the projections found on the gorgonians it spends its life lurking in. Indeed, a single Denise's pygmy seahorse may spend its entire life attached to the same piece of coral.

Like other seahorses, the male Denise's pygmy is responsible for storing the eggs of their offspring, effectively giving birth instead of the female. Once the baby seahorses have emerged from their father's ventral pouch, they are left to fend for themselves.



West Africa's rainforest antelope

As well as being the world's smallest antelope, royal antelopes take the title for world's smallest ungulate (hoofed mammals) and the world's smallest ruminant (mammals that ferment their food in specialised stomachs, like cows). Being so small requires the royal antelope to be incredibly alert – they use their slender legs to sprint into the safety of cover as soon as they sense danger.

For this reason, royal antelopes prefer to live in dense shrublands and forests in their native home of West Africa. These habitats provide the vulnerable animals with plenty of places to hide, while also being rich in the foliage, fruits and fungi that they feed on.

Habitat deterioration and hunting for bushmeat are two of the most significant threats faced by royal antelopes. Luckily, there are several protected areas where these animals thrive – sanctuaries like the Tai National Park in Côte d'Ivoire and Assin-Attandanso Game Production Reserve in Ghana help to safeguard the future of the species.

Body length: 400mm (16in)

Shoulder height: 250mm (10in)

Comparison: The size of a chessboard

10 of the tiniest animals on Earth

The bat that eats on the go

The Kitt's hog-nosed bat is another strong contender for smallest mammal in the world, as it has the smallest skull of any mammal. Despite being named for its distinctive pig-like snout, this bat's common nickname – the bumblebee bat – gives a better indication of how small this flying mammal really is.

These bats are the only known members of the Craseonycteridae family. They can be found in western Thailand and southeast Burma, although with an estimated population of less than 10,000 individuals, they are considered Vulnerable on the IUCN Red List of Threatened Species.

Dangers to the species include the annual burning of forest areas in Southeast Asia, as well as habitat disturbance caused by increasing numbers of people visiting their roosting caves.

Most of these bats' meals are eaten on the wing – they use echolocation to track down small insects before gobbling them up mid-flight.



The Kitt's hog-nosed bat is crepuscular, which means it is active at dawn and dusk



Size: 33mm (1.3in)

Comparison: The size of a bumblebee



The blind snake of Barbados

Imagine a snake that's as thin as a piece of spaghetti, and you've more or less dreamed up the Barbados threadsnake.

As the smallest snakes in the world, these minuscule serpents are completely blind and push the evolutionary limit of how

small a snake can be (they need to reach a certain size in order to eat). Their favourite meals consist of termites and ant larvae.

Size: 100mm (3.9in)

Comparison: The size of a noodle

“These minuscule serpents are completely blind and push the limit of how small a snake can be”



Barbados threadsnakes are thin enough to coil themselves around a coin

The frog that can mimic insects

The world's tiniest vertebrate, *Paedophryne amauensis* is a forest-dwelling frog. This micro amphibian was only discovered when scientists used triangulation to locate the source of an unknown animal call (they have developed calls similar to some insects). The team then began manually scooping up handfuls of leaf litter. Eventually the process worked and they spotted a tiny frog jumping around among the dirt and foliage of the forest floor.

Paedophryne amauensis lives in the tropical forests of Papua New Guinea. It uses its diminutive body size to occupy a habitat that other vertebrates are too large to take advantage of – the moist leaf litter on the forest floor is an ideal environment for the small frog, preventing its body from drying out.

Unlike most frogs, they give birth to live young rather than laying frogspawn that releases tadpoles. These fully formed baby frogs are called 'hoppers'.

Size: 7.7mm (0.3in)
Comparison: The size of a baked bean



"This micro amphibian was only discovered when scientists used triangulation to locate its calls"

The shrew that hunts by stealth

In terms of body mass, the Etruscan shrew is the smallest mammal on Earth. They weigh 1.8 grams (0.06 ounces), making each individual shrew roughly as heavy as a playing card.

They may be tiny and incredibly light, but Etruscan shrews have a serious appetite. On an average day, each shrew can eat twice its own body weight in insects – the greedy rodents are able to eat so much due to their

lightning-fast metabolisms. For its size, the Etruscan shrew is also a fearless hunter, using its whiskers to detect prey equal in size to its own body, then taking it down before it makes a single evasive move.

Of course, being so small means these shrews are in danger of being eaten themselves. Darting in and out of cover is required to avoid being caught by predators.

Size: 40mm (1.6in)

Comparison: The size of a matchstick



© FLPA

10 of the tiniest animals on Earth

"These geckos reduce their activity during the driest parts of the day"



Size: 18mm (0.7in)

Comparison: The size of a penny

The dwarf gecko that likes it wet

Little is known about this mysterious and tiny reptile, an island inhabitant found living on the British Virgin Islands of Virgin Gorda, Tortola and Mosquito Island.

Although it lives in arid environments, the Virgin Islands dwarf gecko's tiny body size means it struggles to retain water. For this

reason, it spends most of its time hiding under rocks to prevent its body from drying out in the Sun.

These geckos also reduce their activity during the driest parts of the day, and adjust their reproductive cycle so that their offspring arrive during the wettest months of the year.

Due to its tiny size, the Virgin Islands dwarf gecko loses water 70 per cent faster than other gecko species



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Animal architects

Inside the nest of an aerial acrobat

RUBY-THROATED HUMMINGBIRD

Archilochus colubris
Class Aves



Territory North and Central America

Diet Nectar, small insects and spiders

Lifespan 5 years

Adult weight 2-6g

(0.07-0.21oz)

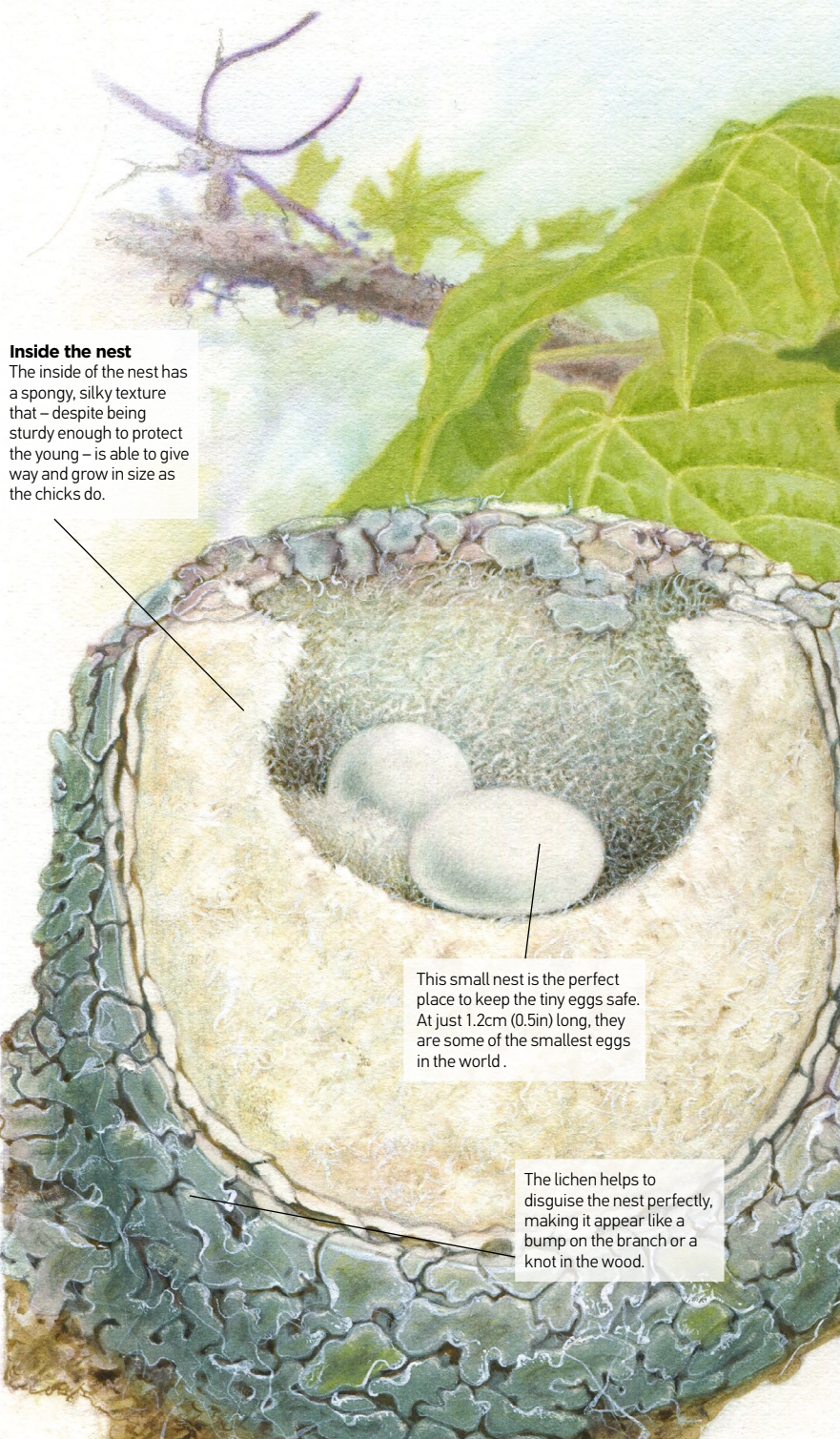
Conservation Status



LEAST CONCERN

The ruby-throated hummingbird is one of nature's most skilled fliers. This tiny creature is one of the only birds able to fly backwards. Alongside their acrobatic prowess, they have a talent for architecture. They construct tiny, delicate nests to rear their young and stay hidden from predators.

After the eggs have hatched, the female leaves the nest for just a few minutes every hour to find food for her demanding young



Inside the nest

The inside of the nest has a spongy, silky texture that – despite being sturdy enough to protect the young – is able to give way and grow in size as the chicks do.

How they build it...

How this small bird builds its tiny nest



Finding materials

This hummingbird's nest starts off very much like any other nest. The female will hunt around the area looking for branches and twigs that she can use to weave together to create the basic shape and structure. To this she will add any odd bits of fluff or feathers that she can find in order to pad out the nest.



Taking shape

As the female carefully constructs her nest on her chosen branch, she sits in what will become the middle of the nest, placing the materials around her body as she wriggles from side to side. This movement is what forms the rounded cup-like shape, providing the space in which she will eventually lay her eggs.



Binding together

It is the final stage that makes this bird's nest so special. Their nests are only around five centimetres (two inches) in diameter, so to ensure the nest stays sturdy in strong winds, the female gathers together spider webs to glue the nest together. To keep it hidden from predators, she weaves moss and lichens around it.

This small nest is the perfect place to keep the tiny eggs safe. At just 1.2cm (0.5in) long, they are some of the smallest eggs in the world.

The lichen helps to disguise the nest perfectly, making it appear like a bump on the branch or a knot in the wood.

Plant material is gathered from the surrounding area and expertly woven into the structure of the nest for insulation.

Multi-tasking

Depending on the weather, in warmer climates, it isn't uncommon for the ruby-throated hummingbird to create more than one nest at a time, feeding her chicks in one while she lays eggs in another.

Laying eggs

The female lays one egg, has a day to rest, then lays another. She will only ever lay a maximum of three eggs in one nest. At birth the chicks are just 2.5cm (one inch) in length.

Motherhood

The female begins to incubate her eggs once they have been laid. She lovingly cares for her eggs for around 14 to 16 days, but sometimes up to 21 days in colder weather. Once they have hatched, the young are entirely dependent on her for around three weeks until they are ready to leave the nest.

One use only

The nests are so delicate they are only used once, as they are not able to withstand the winter climate, so the female must build a new nest each time she is ready to lay eggs.

Balancing act

Although the nest is fragile, rather than building them in the crook or fork of a tree for additional support, this hummingbird builds its nest balanced on top of a branch.

Safe above ground

The ruby-throated hummingbird builds the nest anywhere from three to 12m (ten to 40ft) above the ground. This keeps the chicks safe from predators on the ground such as cats and foxes.

Five ruby-throated facts

Due to the reduced number of trees in the western US, nests are increasingly being found on artificial structures.

As the landscape becomes dominated by humans, it's likely these little birds will still be able to continue to survive and thrive.

To test if a branch is strong enough to support the nest and her young, the female flies at a prospective branch at great speed. She crash-lands onto it and clings to it, repeating the process until she can be sure that it is suitable.

Sticking lichen to the nest for camouflage isn't a random process.

The hummingbird painstakingly blends the construction into its surroundings, placing the lighter pieces on parts where the sun hits, and the darker parts in the shade.

The side of the nest that faces the wind is made thicker in order to protect the chicks from the cold. However, to prevent them from overheating, their mother will make small gaps in the other side of the nest to allow air to flow through.

These little birds take great pride in their nests, and are quite particular about where they take residence. They are known to shun nest boxes left out in gardens, as they feel too enclosed and unable to escape quickly should they need to.



A large, gnarled oak tree trunk with green ferns at its base.

Wildlife of an oak tree

The mighty oak stands tall for hundreds of years, and tangled in its roots and branches is an entire ecosystem

Words **Laura Mears**

These towering trees can live for centuries, stretching up to 40 metres (131 feet) into the air, and dropping up to 90,000 acorns in a single year. Season after season, their leaves, buds, branches, bark, roots, and acorns provide food and shelter for hundreds of different species.

An oak tree's gnarled bark splits and cracks as it ages, providing hide-holes for hundreds of species of insect, while its distinctive lobed leaves spread wide,

allowing light to trickle through to the damp forest floor below, supporting a rich cushion of plant life. Birds come to the branches to feed, bats to roost, and squirrels to make their nests.

As the year ends, falling leaves become a buffet for the invertebrates and fungi living on the forest floor, and when the acorns drop, animals large and small take advantage of the nutritious starch to keep them going over the winter.

Animals of the oak

According to the Woodland Trust, oaks support more wildlife than any other tree in the UK, providing a haven for insects, food for birds and mammals, and a yearly supply of fallen leaves for invertebrates, plants and fungi living on the forest floor

Pied flycatcher

These little birds spend their winters in the warmth of Africa, but come summer, they return to British oaks to breed. After stocking up on seeds and insects, they lay six or seven pale blue eggs in nests made from leaves, moss and lichen.



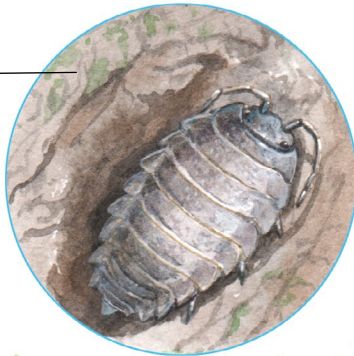
Bat

Most species of bat in the UK sleep in treetops. They change position depending on the time of year, moving upwards in the summer to soak up the sunshine, and down in the winter to find a safe spot to hibernate. Holes and cracks provide good hiding places.



Grey squirrel

These feisty North American rodents have chased away the native red squirrels in most British oak forests. They make their homes inside spherical twiggy structures called dreys, and spend the autumn months gathering and burying acorns. They also eat bulbs, tree shoots, roots and fungi, and even the occasional egg.



Woodlouse

These armoured animals are a type of crustacean. They have 14 legs, distinctive segmented bodies, and some are able to roll up into a ball for defence. They lurk in dark, damp places, and play an important role in clearing up decaying material and recycling nutrients at the base of the tree.



Field mouse

Badger



The wildlife of an oak tree

Uses

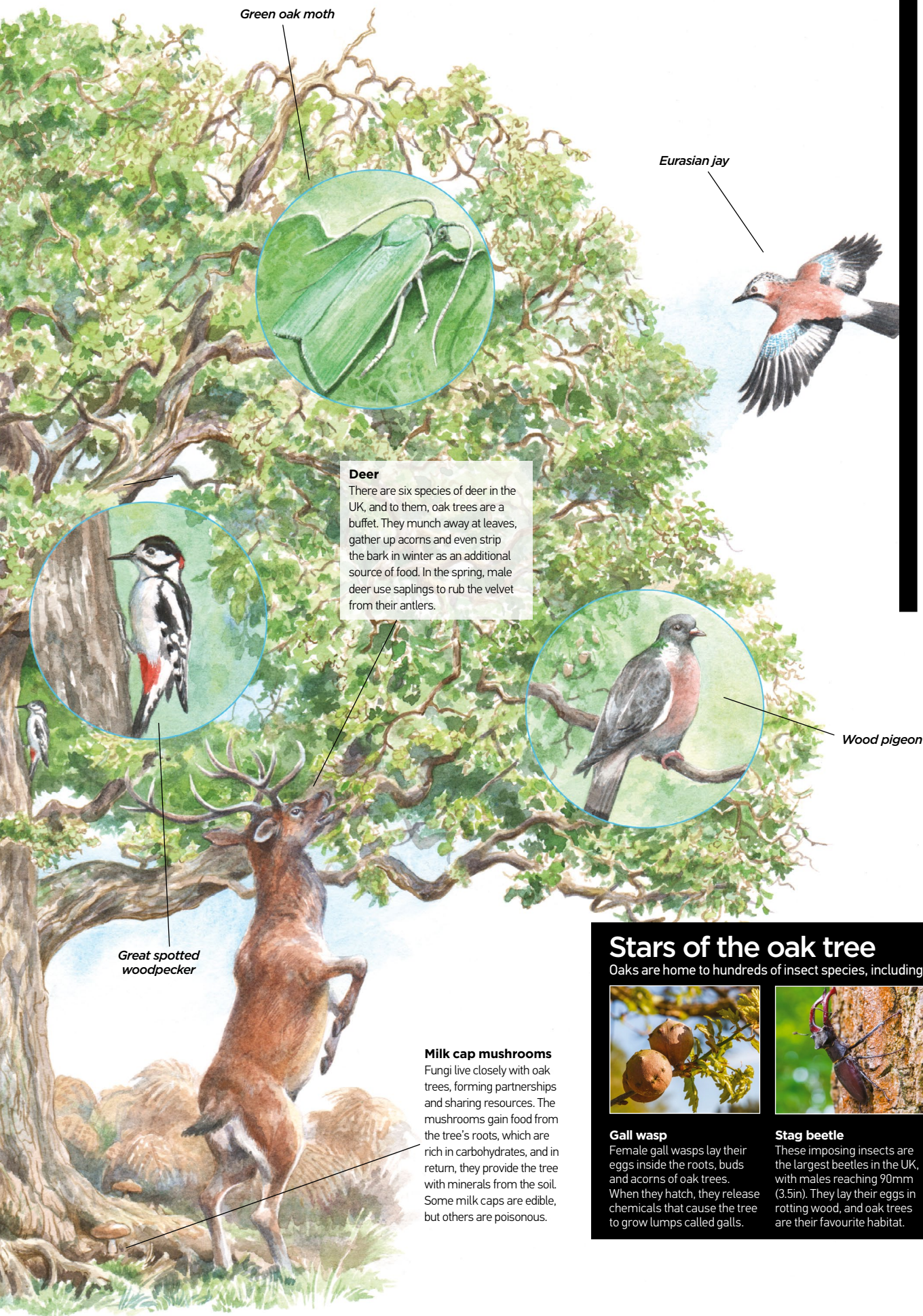
Oak is a hardwood with a complicated structure. It is dense and can endure getting wet, and as a result, it became a common material for ships, buildings and furniture. The wood has also been used for smoking, tanning and for making charcoal, while the acorns are popular with domestic pigs.

Threats

Like us, trees can suffer at the hands of pests and diseases. At the moment, many oak trees in the UK are suffering with acute oak decline, a deadly disease that causes their bark to leak black fluid. It has been linked to bacteria, which could be being transmitted from tree to tree by beetles living in them.

Symbolism

As the tallest, oldest trees in the landscape, oaks have been an important part of life for centuries. Oaks were offered to the Celtic, Roman and Greek gods of thunder and lightning, and their leaves were used by royalty to make wreaths and crowns. Even the traditional yule log was originally oak.



Green oak moth

Eurasian jay

Deer

There are six species of deer in the UK, and to them, oak trees are a buffet. They munch away at leaves, gather up acorns and even strip the bark in winter as an additional source of food. In the spring, male deer use saplings to rub the velvet from their antlers.

Wood pigeon

Great spotted woodpecker

Milk cap mushrooms

Fungi live closely with oak trees, forming partnerships and sharing resources. The mushrooms gain food from the tree's roots, which are rich in carbohydrates, and in return, they provide the tree with minerals from the soil. Some milk caps are edible, but others are poisonous.

Stars of the oak tree

Oaks are home to hundreds of insect species, including these six-legged inhabitants



Gall wasp

Female gall wasps lay their eggs inside the roots, buds and acorns of oak trees. When they hatch, they release chemicals that cause the tree to grow lumps called galls.



Stag beetle

These imposing insects are the largest beetles in the UK, with males reaching 90mm (3.5in). They lay their eggs in rotting wood, and oak trees are their favourite habitat.



Purple hairstreak

These magnificent royal-purple butterflies only live in oak woods, and they can be spotted flying elegantly between the branches in early to mid summer.



NATURE'S GREATEST INVENTIONS

The animal kingdom has inspired some of the planet's greatest minds to create solutions to modern problems

Words **Amy Grisdale**

Nature's greatest inventions



The beaked Bullet Train

When Japan developed the incredible Shinkansen Bullet Train, it was admired around the world. Since its maiden journey in 1964, it now travels 320 kilometres (200 miles) per hour and covers almost the entire length of the country. But initially it caused huge problems for the locals.

The sounds the train created were high above environmental standards, especially when entering narrow tunnels. The rounded, bullet-shaped front of the train caused an atmospheric pressure wave to streak through the tunnel, and this surge of air pressure created a loud boom at the tunnel exit. The sound could be heard as far away as 400 metres (1,312 feet) and attracted a multitude of complaints from members of the public living nearby.

Keen birdwatcher and engineer, Eiji Nakatsu used his knowledge of the avian world to fix this serious issue. He knew that kingfishers could dive into water without creating a splash, and believed

this feature could be applied to the trains to eliminate the noisy pressure waves.

The secret is in the kingfishers' long, pointed beak, which widens nearer to the face. It helps them easily travel from the low-resistance medium of air to the medium of water, which provides a lot more drag. The shape of the beak allows water to flow past it rather than being forced away from it and creating a splash.

The front of the train was redesigned to replicate this feature, as the only other solution would have been to change the shape of the tunnel, which would have been a lengthy and costly process.

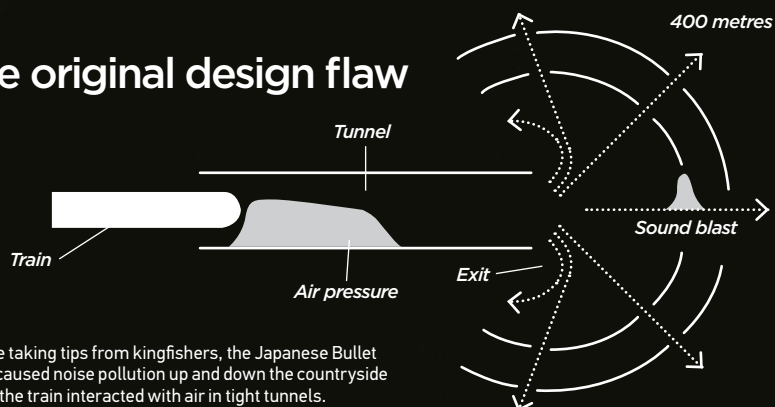
The nose cone was lengthened by nine metres (30 feet) and given a gradually sloping point. This allowed the train to run at the standard noise level of 75 decibels, and also helped the service to become around ten per cent faster and use approximately 15 per cent less electricity.



ABOVE The Bullet Train runs on a network originally built to supply Japanese troops in China in the 1930s



The original design flaw



Before taking tips from kingfishers, the Japanese Bullet Train caused noise pollution up and down the countryside when the train interacted with air in tight tunnels.

Self-shoaling cars

Film and television have been promising them for years, and although we will probably survive without hoverboards and robot butlers, self-driving cars could do a lot of good.

In the US alone, over 37,000 people die in traffic collisions each year. Around the world car accidents cost billions in road maintenance, insurance claims and emergency service actions, as well as tragedy for those involved. But even though driverless cars have been in development since the 1920s, the latest technology is yet to fully convince the public.

Nissan's engineering director, Toru Futami has created robots named EPORO that mimic the movements of schooling fish. This will help to integrate autonomous cars with human-operated vehicles in the future.

When fish move as a group they travel at close distances without colliding into one another, and mimic each other's movements to create seamless group movement.

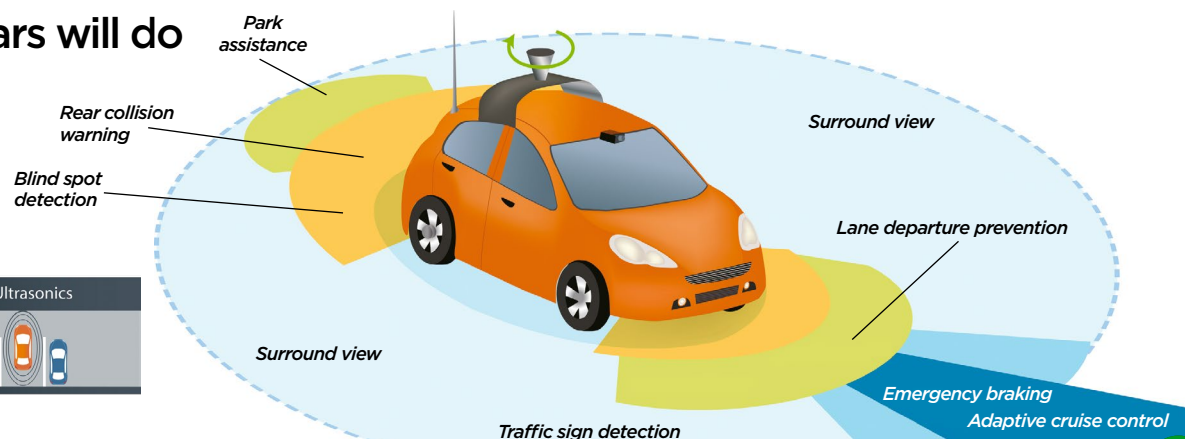
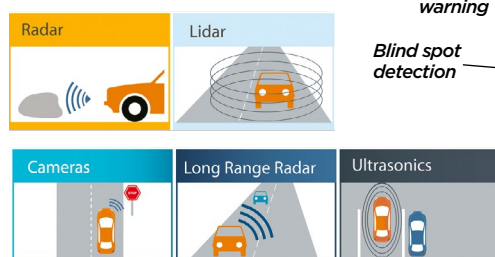
Fish achieve this by detecting tiny changes in water pressure created by others in the shoal around them. Lines of sensors along

the flanks of the fish allow information about environmental changes to be processed by the nervous system quickly to generate a response.

Nissan's robots use 180-degree laser technology to monitor the positions of the other robots and travel extremely closely and at high speeds without making contact. In the future, if all cars were able to operate using this technology, it could eliminate the need for stopping signals and road markings. This would allow more cars on the road with less congestion, as well as saving lives.

What driverless cars will do

Just some of the features car companies are developing for the future of automobile travel, thanks to the help of some aquatic assistants



Whale-powered wind turbines

Renewable energy is big business, and the world is racing to find alternatives to using finite resources like oil and coal. Wind turbines are a promising area, but although they are in place around the world, they do have their problems.

In areas with gentle winds turbines aren't able to produce as much energy and are sometimes even still. Birds can become victims of the spinning blades, and there is a degree of noise pollution associated with these 'eyesores'. Many are opposed to their construction and property prices can even tumble in turbine terrain.

One solution could be found in the flippers of humpback whales. These are covered in lumps rather than being smooth like a wind turbine blade. This was originally thought to be a more aerodynamic design as surely particles can pass by a smooth surface more easily than an uneven one. But research has proven that this isn't actually the case at all.

Humpback whales' pectoral fins are placed either side of the body and essentially act as the animals' arms. Through extensive testing these bump-covered flippers were found to be 40 per cent more dynamic than a smooth fin, allowing water particles to zoom past at speed. It's thought that protrusions on the leading edge of the fin create areas of low pressure, causing air or water to rush into the low pressure area, allowing the fin to move with less drag.

The applications of this development range from your humble ceiling fan to new types of wind turbine. They can help windmills overcome the biggest problems traditional models demonstrate, like unreliability in light wind.

The aerodynamic shape will also allow the turbines to turn with much less force than is required to rotate the smooth versions. The whale fin blades can even make the turbines more reliable in turbulent air and reduce noise pollution.

“Humpback whales' pectoral fins were found to be 40 per cent more dynamic than a smooth fin, allowing water to zoom past”



Butterfly-inspired e-readers

Tablets have changed the way thousands of us read, and many of you could be reading these very words on a screen rather than a page. These devices are durable and ideal for reading on the move, eliminating the need for carting around a miniature library when wanting to take a good book on holiday.

However, so far no tablet is dazzling enough to combat the Sun's powerful glare, and although this poses no threat to humans, it's still a step we are yet to take. The future of this technology is bright though. New prototypes are in development that reflect incoming sunlight in the same way as iridescent butterfly wings.

The breathtaking colours of many butterflies are not created by simple surface pigments, but by microscopic scaffolding set into the scales covering each wing. These tiny structures change the wavelengths of light and allow it to be reflected as a different colour.

Light rays bounce off butterfly wing scales at different angles and depths thanks to this complex structure and are received by the eye as different coloured light.

The e-reader created by Qualcomm is able to use incoming sunlight to create vivid colours on the screen. This means the device needs charging much less frequently and emits 94 per cent less carbon while active than an LCD display of the same size.



RIGHT The current cost of running a wind turbine ranges from around £3,600 to over £100,000 per year



Gecko feet adhesive

The human race is constantly trying to invent new adhesives to improve aerospace engineering, automobile technology, and even the medical industry. Bonding two objects permanently, or even temporarily, has proven a challenge for hundreds of years, and there is room in the market for a product that is sticky only when you need it to be.

Spencer Silver worked at stationery company 3M in 1968, and when trying to develop a superstrong adhesive he accidentally came up with a very weak one. It could just about hold a piece of paper to the nearby wall, and peeled away without leaving any residue. The first Post-it Notes were born.

Gecko feet have intrigued scientists for years, as they have this same quality. In fact, they stick to surfaces when the animal needs them to, but peel away at will. The feet have attachment capabilities on smooth surfaces due to the structure of the sole.

Each foot has microscopic fibres that use intermolecular forces to bind to materials. They are at a 20-degree angle and are able to manipulate the attractive forces between negative electrons and positive protons. This causes the foot to stick to a surface with no grip, and simply pulling the foot away is enough to break the bond.

Now a controllable adhesive that works in a similar way could be on the horizon. Mechanical engineer Yigit Mengüç and his team have designed a surface with the sticky qualities of gecko feet that could be used to sort small parts and components.

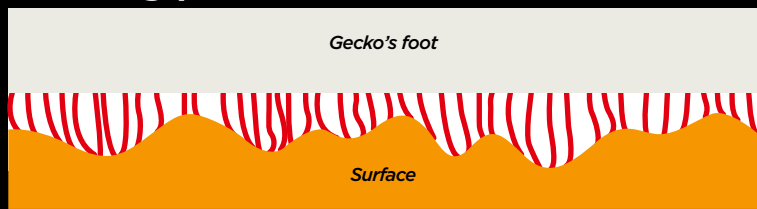
The adhesive allows pick-and-place work without the need for a single person to be present, if the adhesive is attached to a robot. This is called industry automation, and many factories rely on this kind of technology to keep their costs down.

The gecko foot may still inspire more technology, and what has already been done is far from perfect. It could give rise to antigravity boots or Spiderman-style wall climbing. It's just going to take a while for humans to replicate nature.

“Geckos’ feet stick to surfaces when needed, but peel away at will”

Sticking point

The invisible science beneath geckos’ feet



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Explore the Earth

ARGENTINEAN ADVENTURE

With mountains, glaciers, deserts and wetlands to explore, this untouched part of the world offers a raw experience of nature and its incredible biodiversity like no other

Words Amelia Jones

Travel expert

Sales manager for Condor Travel Argentina, Martin Perez has been in the travel industry for 20 years. He is passionate about his diverse country and its landscapes



Due to its vast size and considerable variations in altitude, Argentina has a wide range of climate types and landscapes. From semi-arid areas in the northwest and sub-tropical areas in the northeast, to temperate oceanic climates in some areas of Patagonia and tundra areas on the southern tip of the country, Argentina is diverse and beautiful.

This climate range allows us to take pleasure in having such an assorted range of wildlife. Exploring the different corners of Argentina, you will find big cats such as jaguars and pumas, three species of American camelids: llama, alpaca and vicuña, spectacled bears (or Andean bears), capybaras, giant anteaters, rheas, tapirs and caimans. Birdwatchers can discover over 900 different bird species, while our coasts and seas are home to king, southern rockhopper, gentoo and Magellanic penguins. In Peninsula Valdés you can sail among southern right whales and dolphins or visit a colony of sea lions. All in all, Argentina boasts a great biodiversity of wildlife and impressive landscapes.

Flat-faced fruit-eating bat

Native to the far north of Argentina, the flat-faced fruit-eating bat is a nocturnal species that feeds almost entirely on fruit. They are 11cm (4.3in) long, weigh just 69g (2.4oz) and have faint white stripes on their short-snouted faces.

Geoffroy's cat

Common across the entire region, the Geoffroy's cat is similar in size to a domestic cat. Unlike other cats, Geoffroy's cats stand on their hind legs to scan the area, using their tail for support. They are nocturnal and prey on hares, rodents, lizards and fish.

Dwarf armadillo

Also known as the pichi, the dwarf armadillo is native to Argentina and is the only armadillo to hibernate. It can be found in central and southern Argentina in the steppe grasslands, where it digs its burrows in the sandy soil.

Travel guide



When to go

Due to varied climates, September to November and March to April are the best months to see the whole country. Peninsula Valdés has a greater species density from July to December.



How to get there

Direct international flights are available from the UK, US, Europe, Australia and South Africa to Ezeiza International Airport in Buenos Aires. Onwards travel is by domestic flight, bus or car.



What the weather will do

The climate is extremely varied. Summers are warm and wet – except for Patagonia, where it's dry – while winters are mild in the north, cool in the centre and snowy in the south.



What to take

Be sure to pack suitable clothing for all weather. Good walking shoes and mosquito repellent are a must, as well as plenty of water and supplies for the mountainous regions.

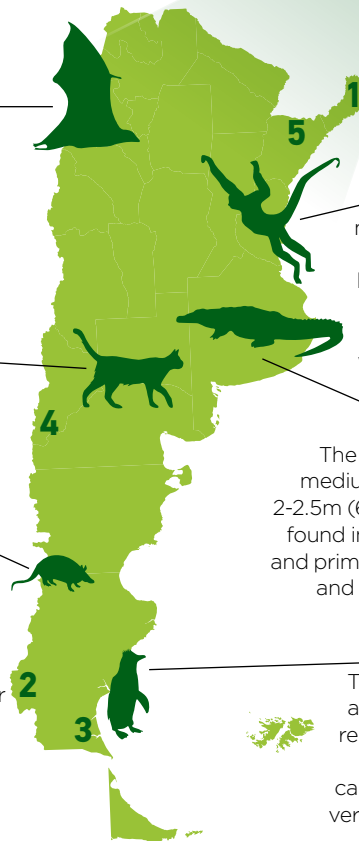


What you'll see

Argentina is incredibly diverse. Soak up the culture of Buenos Aires, go trekking in the Andes, explore the Patagonian grasslands and Iberá Wetlands, or take a tour of the coastline.

Map key

- 1 Iguazú National Park
- 2 Los Glaciares National Park
- 3 Monte León National Park
- 4 Nahuel Huapi National Park
- 5 Iberá Wetlands



Black and gold howler monkey

Found in the northeast, black and gold howler monkeys are known for their loud calls, which can be heard from 5km (3mi) away. They have a prehensile tail for gripping onto branches, which acts as an extra hand.

Yacare caiman

The yacare caiman is a small-to-medium sized crocodile at around 2-2.5m (6.6-8.2ft) in length. They are found in the northeast of Argentina and primarily feed on small fish, birds and reptiles of the Karoo Desert.

Macaroni penguin

These charismatic birds have a distinctive yellow crest and red eyes. Listed as Vulnerable by the IUCN Red List, they can sometimes be seen at the very southern tip of Argentina, where they live in large colonies on offshore islands.



Explore an elephant seal colony

Known for their intriguing facial protrusions and charismatic looks, southern elephant seals are large ocean-going seals of the Southern Hemisphere.

These blubbery pinnipeds can be found in huge numbers in the Península Valdés on the east coast of Argentina, the fourth-largest colony of elephant seals on the planet. They are truly colossal creatures, with male bulls weighing up to 4,000 kilograms (8,800 pounds) and measuring up to six metres (20 feet) long.

They take their name from the male's large proboscis, which is used to produce loud roars in mating season. But their noses

have another function: specially adapted cavities reabsorb moisture when the seal exhales, keeping them hydrated.

Elephant seals spend around 80 per cent of their lives in the ocean feeding on squid, octopus and fish. They are agile swimmers and can dive to a depth of 1,550 metres (5,085 feet) and remain underwater for up to 120 minutes as they have a large volume of blood for storing oxygen. A thick layer of blubber protects them against the cold, but despite their appearance, they are fast on land thanks to their hind limbs, which propel them forwards.

While their numbers are prolific today, elephant seals were hunted to the brink of extinction in the 19th century and still face threats such as fishing and marine waste.

Full-day tours of the Península Valdés are offered from Puerto Madryn with bilingual guides and naturalists. Here you can see elephant seals in their natural habitat, along with penguins and sea lions. Tours also include optional whale watching boat trips between July and December.

Find a flamboyance of flamingos

Probably one of the most iconic birds on the planet, these magenta-hued birds are a true wonder of the natural world. Flamingos are wading birds and Argentina is home to three species with overlapping habitats and nesting areas: the Andean, Chilean and James' flamingos – which can be found in the Laguna Brava Natural Reserve in the northeast. Designated as a wetland of international importance, this reserve is a water and salt mirror that stretches for 12 kilometres (ten miles).

James' flamingos live in high altitudes, and were thought to have gone extinct until a small flock was found here in 1956. Sadly, due to habitat destruction and a tradition of egg theft among local cultures, these birds are classified as Near Threatened by the IUCN Red List, although efforts have been made to protect them.

These birds are easily distinguished by their light pink feathers, brick-red long legs and bright yellow black-tipped bills, while rare Andean flamingos are the only species to have yellow legs. At 92 centimetres (three feet) tall, they are long birds; their neck consists of 19 cervical vertebrae, allowing them to swing their heads, and their long legs have knees, although they are not visible. While uncommon in captivity, flamingos are able to fly: their black feathers are specifically used for flight.

Guided 4x4 tours operate from Vinchina, about 109 kilometres (68 miles) southeast of the reserve, and you may even spot other threatened species, including pumas, guanacos and red foxes.

More than wildlife



The Andes

Stretching across Argentina's western edge, these beautiful mountains offer stunning scenery and hiking spots for those looking to explore on foot, as well as the continent's highest peak, Cerro Aconcagua.



Wine tasting

With a range of wines to suit every taste, Argentina offers secluded sophistication for those looking to unwind. The town of Maipu, near Mendoza, boasts many wineries.



Iguazú Falls

Meaning "big water" in the Tupi or Guarani language, the Iguazú Falls on the Argentina-Brazil border is the largest waterfall system in the world, with 275 individual drops.



Vibrant cities

Buenos Aires (the capital) boasts great food, local art and culture, and a bustling nightlife. Experience the local tango in true South American style in San Telmo, a tango hotspot.



Perito Moreno glacier

Considered by some as the eighth wonder of the world, this 250km² (97mi²) glacier is unusual in that it is advancing, while most other glaciers retreat. It can be reached by land.



Spot some vibrant toucans

Found solely in the northeast of Argentina in the beautiful Iguazú National Park, the toco toucan is a bird with an impressive bill. The most well-known and the largest of the toucan family, toco toucans boast jet-black plumage, a white throat and a blue or orange eye ring. But their most striking feature is their lightweight yellow beaks, which are the largest of all birds relative to body size, and measure over 20 centimetres (eight inches) in length.

The exact purpose of this hollow bill is still uncertain. Some scientists believe it is used as a visual warning to scare off predators, to attract a mate, or as an aid when peeling fruits. However, recent research suggests the beak is used to

regulate body temperature through adjusting blood flow, and a toucan's bill accounts for 30 to 60 per cent of the bird's heat loss.

Toco toucans are able to fly in rapid bursts but rely on gliding to get from tree to tree. They are vocal birds and produce deep, coarse croaking sounds, as well as bill-clacks and rattling calls. With these vocal displays and vibrant bills, they should be easy to distinguish from the luscious rainforests of the Iguazú Falls, a well-known tourist spot on the Argentina-Brazil border.

Keen birdwatchers may also be delighted with sights of other exotic species, such as black-fronted piping guans, spot-billed toucanets and blond-crested woodpeckers.

Cruise with a capybara

Otherwise known as water pigs, capybaras have slightly webbed feet, are strong swimmers and feed on water plants and grasses. They can often be found wallowing in muddy pools in the Iberá Wetlands they inhabit, as their dry skin needs to be submerged to stay healthy. Water also has another benefit for capybaras, as they use it to escape danger and can even hold their breath for up to five minutes.

As capybaras spend so much time submerged, it is no surprise that the best way to see these loveable rodents is from the water. Boats, or lanchas, allow you to gently glide through the wetlands and experience the diverse wildlife the area has to offer, and there are a number of ranches and lodges in the reserve for overnight stays. The nearest airport is Posadas Airport, which is four-to-six hours away, so a few days are needed to explore this wildlife-rich region, which also boasts exotic birds, marsh deer, caimans and many colourful butterflies.



Spy on an elusive cougar

Commonly known as a puma or mountain lion, the Argentine cougar is a top predator of central and western Argentina, found in the San Guillermo National Park. They feast mostly on vicuñas, which make up 80 per cent of their diet, but may also prey on guanacos, hares and mice. They are elusive cats and are difficult to spot, but their numbers are increasing as prey numbers thrive.



Walk with a herd of guanacos

As one of the largest mammals in South America at 1.2 metres (3.9 feet) tall, guanacos are similar to llamas, and their soft wool undercoats are often used in luxury fabrics. They live in small herds in the south and northwest of Argentina and are fairly easy to spot in one of the many national parks and reserves.

Guanacos are able to survive in both mountains and on the Patagonian steppe; they are adapted to live in high altitudes with low oxygen, as they have four times as many blood cells as humans.

They are excellent swimmers and can run at speeds of up to 56 kilometres (35 miles) per hour over treacherous and rocky terrain; two padded toes on each foot help them to keep their footing and escape the clutches of a cougar. When threatened, guanacos may spit and release a high-pitched bleat to alert the rest of the herd, which is said to sound like laughter.

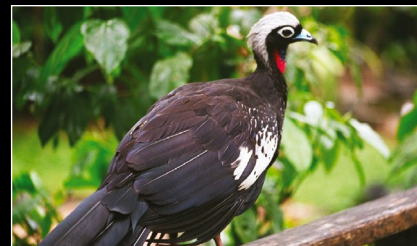
Visit between December and March to spot baby guanacos, known as chulengos, which are able to walk just five minutes after birth.



Spot a secretive southern pudu

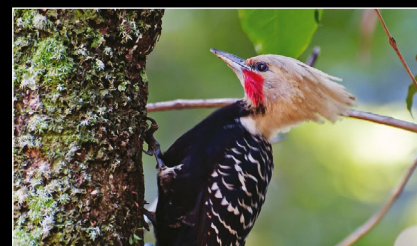
Found on the slopes of the Andes, the elusive pudu is the smallest deer in the world at just 40 centimetres (16 inches) tall. Due to habitat loss and overhunting they are classified as Near Threatened by the IUCN, but some pudus have been successfully reintroduced to the Nahuel Huapi National Park. Pudus are solitary creatures and will mark their territory with large dung piles. They are very easily frightened and difficult to spot, so you'll need to keep quiet if you are to have a chance to see this endearing native.

Argentina's stunning birds



Black-fronted piping guan

Listed as Endangered by the IUCN, this bird is found by the Iguazú Falls. They have a white wing patch with three rows of black dots, and red feet and legs.



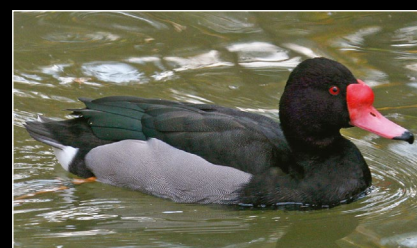
Blond-crested woodpecker

Found in the northeast of Argentina in lowland forests, these birds are dazzling with their blonde plumage. They have two toes facing forwards and two backwards, as well as central tail feathers.



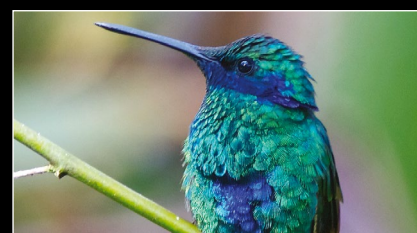
Rufous hornero

Also known as the red ovenbird, the *Rufous hornero* is the national bird of Argentina. Found in savannahs and scrubland, they sing in duets and beat their wings at their sides in time with their trills.



Rosy-billed pochard

These diving ducks boast a distinctive red bill on males (slate-grey on females), black plumage, and a white stripe on their outstretched wings. Rosy-billed pochards from Argentina migrate north for winter.



Sparkling violet-ear

Found in the highlands of northern Argentina, this dazzling hummingbird is common near coniferous or evergreen eucalyptus forests. At up to 15cm (6in) long, it is the largest violet-ear and extremely territorial.



Glimpse a giant anteater

Known as the ant bear, these shaggy-coated giant anteaters are a wonderful sight of the Iberá Wetlands. As their name suggests, giant anteaters are the largest of their family, reaching up to 2.17 metres (7.12 feet) in length. They feed primarily on ants and termites and have no teeth; they use their large claws to dig insects out of the soil, where their long, sticky tongues scoop them up.

While these loveable animals seem well adapted to their surroundings, they are classified as Vulnerable by the IUCN Red List and are threatened by habitat destruction, fires, and poaching for fur and bush meat. Fortunately, conservation work is underway to reintroduce them back into the wild.

The Conservation Land Trust's Iberá Project has been releasing giant anteaters into the wild in the Rincon del Socorro Reserve in the Iberá Wetlands since 2007. They have now released 50-60 anteaters, with at least 33 cubs being born there. If you are lucky enough to spot a giant anteater, look out for a baby on its back, as mothers give their young a piggyback ride until they are weaned.



Spot a colony of penguins

Penguins are a staple feature of the Argentinean coastline and many species thrive here. One such species is the Magellanic penguin, which is easily distinguished by two black bands between its head and breast.

The Punta Tombo Reserve on the east coast is home to the largest Magellanic penguin colony in the world. Each year between September and April, over 100,000 Magellanic penguins venture onto the shore to build their nests. They mate for life and can identify their partner by their call, which is as unique as a human fingerprint.

Although clumsy on land, they are excellent swimmers and their rigid wings are adapted for hunting underwater. They are able to excrete excess salt through a special gland and can dive to depths of 50 metres (164 feet).

While millions of these birds live on the South American coast, they are classified as Near Threatened by the IUCN.



Top tips

Plan your travel

Argentina can be quite an expensive place to visit and requires a lot of travelling to see its length and breadth, but it is well connected by buses. If you are travelling long distances, an overnight bus will save you the cost of one night's accommodation.

Cultural practices

A staple part of Argentinean culture, the cheek kiss is used for all interactions other than business deals. Bear in mind that in Argentina it is considered rude to wave, so be sure to respect the local customs.

Health check

Visit a doctor four to six weeks before travelling and get any vaccinations or medication you need. There have been reports of dengue fever in northern provinces and Buenos Aires, so mosquito repellent is an absolute must.

Travel essentials



Salomon's X ALP LTR W Boots

The 3D protective rubber belts and toe caps offer extra protection and durability, while the Gore-Tex bootie ensures breathable weather protection – the perfect shoe for the diverse landscapes of Argentina. £110

www.salomon.com



Suunto Traverse GPS Watch

With 100 hours battery life, automatic breadcrumb track, storm alarm and FusedAlti technology for measuring altitude, speed and ascent, this watch is perfect for exploring. A flashlight mode is handy for reading maps. £325

www.suunto.com



Oakley Fives Squared Sunglasses

These sunglasses are ideal for outdoor adventures. With condensed cranial geometry and lightweight O MATTER frames to ensure the perfect sleek fit, these sunglasses offer sophisticated UV protection. £80

www.ellis-brigham.com



Salomon Evasion 25 Backpack

Perfect for carrying accessories on a one-day hike through Argentina's mountains and parks, this backpack is stable, comfortable and breathable, and features an internal two-litre bladder compartment. £70

www.salomon.com



1000 Mile Ultimate Lightweight Performance Sock

With Wool Ultra that is 20 per cent lighter than normal wool, these Ultimate Lightweight Performance Socks are great for going the distance. They also dry 30 per cent faster than standard wool socks. £13.49

www.1000mile.co.uk

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Who to travel with

Wildlife

Condor Travel

WWW.CONDORTRAVEL.COM

Valdes Peninsula and Bustamante Bay

You will see a variety of wildlife on this seven-day tour. From £1,874 per person, based on two sharing, including accommodation, transfers and park fees.

Bird watching

Nature Trek

WWW.NATURETREK.CO.UK

Argentine Patagonia

Enjoy 15 days of bird watching in the Península Valdés, Los Glaciares National Park and southern Patagonia. From £5,495 per person, including flights, accommodation and food.

Explore

Steppes Travel

WWW.STEPPESTRAVEL.CO.UK

An Argentina wildlife holiday

Explore the Iberá Wetlands by boat, horse, jeep, or foot, and spend four nights experiencing the bustle of Buenos Aires. From £3,475 per person, including international and internal flights.

Meet the family Squirrels

Their epic nut burying feats are critical for the expansion of the world's forests, but did you know there are nearly 300 species of squirrel, including 44 types of flying squirrel?

Eurasian red squirrel

A squirrel facing an uncertain future

In the UK, Ireland and Italy, numbers of Eurasian red squirrels have diminished dramatically, raising long-term fears for their future. Non-native eastern grey squirrels introduced by humans are partly at fault. The ultra-competitive grey squirrel carries the squirrel paradox virus, which can kill their red cousin. Despite this, red squirrels continue to thrive across the forests of northern Europe and Siberia, favouring the evergreen pine tree for its home and food.

Using their powerful lower incisors, they can open a nut in seconds. The famous red coat varies in colour depending on the time of year and location, but its underbelly always remains a luxurious, creamy white.

Prevost's squirrel

Meet the squirrel with an eye-catching coat

The Prevost's squirrel has a distinctive coat that gives it the nickname 'the tricoloured squirrel'. Black on top with a white stripe separating the chestnut undercoat, this squirrel certainly stands out. Different subspecies have prominent patches on their shoulders too.

The Prevost's squirrel can be found in the old logged forests of Southeast Asia. Baby Prevost's are altricial and only weigh 16 grams (0.6 ounces). Unlike other squirrel species, Prevost's have been known to spend time in groups munching on fig trees. It's believed they help the local ecosystem by eating the fruit of a tree, then scattering the leftover seeds away from the parent tree, making the seeds less likely to be eaten.

Peak breeding season for the Prevost's squirrel is between June and August. Gestation of up to four little ones lasts for about 40 days, where they begin life in hollow tree nests.



EURASIAN RED SQUIRREL
Sciurus vulgaris
Class Mammalia



Territory Northern Europe and Siberia
Diet Tree seeds, fungi and nuts
Lifespan 7 years
Adult weight Up to 350g (12oz)

Conservation Status

EX EW CR EN VU NT LC
LEAST CONCERN

The Eurasian red squirrel can climb and descend huge tree trunks thanks to its sharp, curved claws, while it uses its strong hind legs to leap between trees and its tail to maintain balance.



Arctic ground squirrel

The toughest squirrel of them all

Surviving the rugged terrain and hostile weather conditions of the North American Arctic tundra, the Arctic ground squirrel is perhaps the toughest of the Sciuridae family. By disappearing into burrows covered in lichen and musk ox hair for almost eight months, they are one of the few Arctic animals that actually hibernate.

During their epic winter lie-in, the squirrels' core body temperature drops down to -3 degrees Celsius (26.6 degrees

Fahrenheit) and its heart rate drops to just one beat per minute. When spring emerges and their body clock awakes, males need to protect their territory from rivals and find a mating partner. Females are typically fertile for just 24 hours, and needy males won't leave their side during this time.

The size of an Arctic ground squirrel varies dramatically depending on the season. They spend the summer months frantically fattening up ahead of their winter hibernation.

ARCTIC GROUND SQUIRREL
Spermophilus parryi
Class Mammalia



Territory The Arctic
Diet Grasses, mushrooms and seeds
Lifespan 6 years
Adult weight Up to 2kg (4.4lb)

Conservation Status

EX EW CR EN VU NT LC
LEAST CONCERN





Because they extend their forelimbs laterally during flight, with their hind limbs close together along the tail, the Siberian flying squirrel creates an unusual triangular silhouette.

SIBERIAN FLYING SQUIRREL

Pteromys volans
Class Mammalia



Territory Scandinavia, Russia and Siberia

Diet Green plants, berries and pine cones

Lifespan 4-5 years

Adult weight 130g (4.6oz)

Conservation Status



Siberian flying squirrel

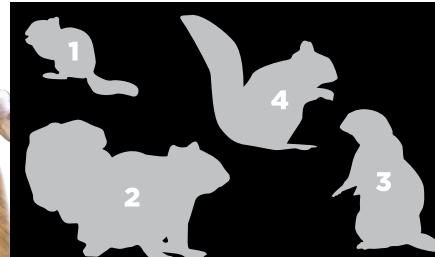
The daring squirrel that can glide more than 100 metres through the air

Although the Siberian flying squirrel doesn't fly in the traditional sense, a membrane that extends between their fore and hind limbs allows them to glide between trees some 100 metres (328 feet) apart.

In the summer months, the flying squirrel is at its most active between an hour after sunset and through the night. Like all squirrels,

most of their time is spent foraging for food, but in truth not much is known about this secretive animal.

We do know that they love areas with old, hollow trees for building nests and hiding food, such as forests with large numbers of aspen, birch and cedar trees. It is also the only flying squirrel to be found in Europe.



1. Smallest

African pygmy squirrel

The African pygmy is the world's smallest squirrel. An average adult weighs just 16.5g (0.6oz), similar to a mouse.

2. Heaviest

Indian giant squirrel

This giant squirrel measures around 36cm (14in), with a tail over half a metre (2 feet) in length. It tips the scales at a portly 2kg (4.4lb).

3. Longest sleepers

Arctic ground squirrel

This critter's body temperature drops below freezing during its eight months spent hibernating to survive winter.

4. Massive tail

Tufted ground squirrel

This squirrel is said to have the biggest tail-to-body ratio of any mammal in the world - it's 30 per cent bigger than its body!

Siberian chipmunk

Not a squirrel but still part of the family

Originating in South Korea, the Siberian chipmunk only found its way into Europe because it was exported as part of the 1960s pet trade. While not a squirrel - it is part of the Sciuridae family - it shares many of the same characteristics. They hibernate over the winter months, and share their burrows with other chipmunks. They are solitary animals normally, enjoying

separate marked territories, but communicate with each other via two types of noise. The lower of the two is thought to be used for mating.

A typical Siberian chipmunk has a distinctive coat of four white stripes and five black stripes across its back. It will only grow to 25 centimetres (9.8 inches) long, and its weight depends on the time of year. Their small stature makes them an easy target for bigger animals of prey, notably weasels. They breed twice a year and the young forage at six weeks.



The Siberian chipmunk is the only chipmunk to be found outside of North America.

SIBERIAN CHIPMUNK

Eutamias sibiricus
Class Mammalia



Territory Northern Asia

Diet Pine and tree seeds, herb roots, birds, small reptiles and fungus

Lifespan Up to 5 years

Adult weight 142g (5oz)

Conservation Status



A squirrel monkey is not a squirrel

Well, obviously. But a squirrel monkey is named so because it bares more than a striking resemblance to many species of squirrel. A squirrel monkey even enjoys the same plant, fruit and seed diet that members of the Sciuridae family typically feast on. Even their bushy tails, which are also used as a balancing tool, look similar from a distance.

Indian giant squirrel

Some squirrels are bigger than others

Giant squirrels are primarily found in the moist tropical forests littered

across northern India, spending most of their time taking shelter in the trees. They use their powerful legs to spring up to six metres (19.7 feet) between trees, and have expanded inner paws for extra grip. Adults can tip the scales in excess of two kilograms (4.4 pounds) and can measure upwards of 40 centimetres (15.7 inches).

The giant Indian squirrel is mostly active during the day, gorging on anything from fruit to bird eggs. They are very agile and wary of the threat of predators, and try to keep away from big cats and snakes by remaining hidden in vegetation. Like many other squirrel species, deforestation is having a catastrophic effect on their natural habitats.

INDIAN GIANT SQUIRREL

Ratufa indica
Class Mammalia



Territory Northern India

Diet Fruit, flowers and bird eggs

Lifespan Unknown (up to 20 years in captivity)

Adult weight 2kg (4.4lb)

Conservation Status



These giant squirrels build eagle-sized nests high among the treetops and raise their young there, normally in small litters of one or two, until they are old enough to fend for themselves.



JELLYFISH ON TRIAL

Renowned the world over for their devastating sting, we put some of the usual suspects in the dock and let you judge whether jellyfish are actually the sea monsters they're made out to be

Words **Adam Millward**

They are some of nature's most beautiful villains. Silent. Faceless. Roaming the seas in huge gangs. Yet also fragile and hypnotic, often looking like extra-terrestrial life forms transported from another world. But, of course, what this marine menace is most known for is its infamous sting.

The jelly's weapon is based around complex cells called nematocytes that line their tentacles (and sometimes bodies), ever poised for both attack and defence. Each nematocyte contains a nematocyst – the stinging element comprising a dose of venom, a tube to deliver it and some form of dart to puncture the skin – or

even shell – of the victim. A nematocyst is fired automatically, within microseconds of contacting another life form or even sensing one close by.

But just how dangerous are jellyfish to us? In the majority of cases, a close encounter will cause an intense burst of pain that leaves a red mark, blistering and sometimes temporary numbness. But this is not to downplay the risks that certain species pose: there are, without a doubt, jellyfish out there with blood on their tentacles. In this feature, we set out to sort the true villains from the jellyfish that have been found guilty through association.



Sea nettles plague America's Eastern Seaboard

These jellyfish are not particularly big, nor are they as venomous as many of their kin, yet their victims are believed to number in the tens of thousands every year. The high sting rate is largely down to their sheer numbers.

During the summer months, huge blooms converge in inlets such as Chesapeake Bay, which are popular with swimmers. A live prediction map has been created by the National Oceanic and Atmospheric Administration (NOAA) to help avoid them.



DANGER FACTOR

In the majority of cases, it only causes a temporary rash, although other species of sea nettle can have more severe effects.

Bell diameter: 20cm (8in)

Tentacle length: <50cm (20in)

Box jellyfish kill more people than sharks

You don't get much deadlier than box jellyfish. In fact, they're widely deemed the most venomous creatures in all the Earth's oceans. While there is no definitive record of how many lives they have taken, it's estimated that around 20 times more people are killed by them each year than sharks.

One of the serial offenders in the 'boxie' fraternity is *Chironex fleckeri* (pictured). Although sometimes referred to as sea wasps, compared to their insect namesakes, this seriously underplays the potency of their sting. They are known to be responsible for 63 deaths between 1884 and 1996 in Australia alone.

So what is it that makes box jellyfish so dangerous? As is often the case, it's a lethal cocktail of factors. First and foremost is its unique venom, which affects vital bodily functions including our nervous and coronary systems. Sometimes the excruciating pain alone can be the cause of death, with the victim fainting and then drowning, or even suffering a heart attack on contact.

Another characteristic that contributes to its deadliness is its ability to propel itself in any direction – a rare trait among jellyfish – making it unpredictable. Plus its translucent body and fine tentacles are difficult to spot until it's too late.

Habitat also plays a part, as they favour warm, shallow waters, often bringing them near bathers and snorkellers.



DANGER FACTOR

About 100 deaths globally per year. Survivors can experience weeks of pain and permanent scars.

Bell diameter: 20cm (7.9in)
Tentacle length: <3m (9.8ft)

1m

5mm

The Irukandji is no bigger than a two pence coin but it can kill you

At the other end of the scale to the lion's mane is this little critter. Don't be fooled by its diminutive dimensions though; this jelly can pack a nasty punch! The Irukandji is also a member of the box jellyfish family, so its venom rates as some of the most potent in the animal kingdom. Indeed, its toxicity has been estimated to be 100-times greater than that of a cobra! The severe and wide-

ranging effects of its sting have even been recognised as a unique medical condition: Irukandji syndrome.



DANGER FACTOR

Irukandji syndrome can cause headaches, nausea, muscle pain, anxiety and, in extreme cases, it can be fatal.

Bell diameter: 25mm (1in)
Tentacle length: <1m (3.3ft)

The lion's mane jellyfish is more dangerous dead than alive

Often in the ocean, the giants are gentler than their smaller kin, and to some extent that holds true with the world's largest jellyfish. Although there have been reports of specimens reaching the same length as a blue whale and weighing up to a ton, serious injury to humans is rare and fatalities rarer still. A major reason for that is because they mainly reside in the chilly waters of the open ocean, so the chances of meeting one while taking a dip are low.

However, they do occasionally drift nearer to land – including the UK – which can cause alarm. But in reality, the greatest risk this jellyfish poses is when it dies: the decomposing body can break up into little pieces that wash up on shore, where the still active stinging cells catch unsuspecting beachgoers unawares.



DANGER FACTOR

Can cause redness and intense pain that has been likened to an electric shock, however the reaction is generally short-lived.

Bell diameter: 2m (7ft)

Tentacle length: <58m (190ft)

Lion's mane jellyfish come in a range of colours, including red, purple and orange

Moon jellyfish are prolific but harmless – most of the time

Moon jellies are some of the most successful jellyfish on the planet. These members of the Aurelia family have adapted to a wide range of temperatures and salinity levels and can be found in virtually all the Earth's oceans. Their huge range means that they share their territory with a wide variety of other jellyfish species, so inevitably there will be occasions when they get the blame for others' misdeeds.

Although moon jellies do possess stinging cells, the chances of a human getting hurt by one are very low, owing to their superfine and very short tentacles. This – along with the distinctive white rings on their bell (actually reproductive organs) and their tendency to float near the surface – means they are easy to avoid. Even if we do come into contact with one, our skin is generally too thick for the sting to have any serious effect.



DANGER FACTOR

The sting is very mild and at worst will cause brief redness/itchiness, unless the skin is already damaged or sensitive.

Bell diameter: 38cm (15in)

Tentacle length: <10cm (3.9in)



Mauve stingers are the Med's most wanted

Outside tropical waters, one of the biggest offenders is the mauve stinger. It is particularly prevalent in the summer months around the Mediterranean, when the jellyfish gather in huge swarms that sometimes drift close to popular beaches.

Their victims can experience pain for up to two weeks, so the species has become known as a holiday wrecker. And in November 2007 a swarm of billions of mauve stingers wiped out an entire fish farm of 100,000 salmon in Northern Ireland. It's worth noting though that where they end up is governed by the currents.

On a more positive note, these jellyfish do offer a spectacular light show at night. Owing to bioluminescence, they emit an ethereal glow, particularly when disturbed in the water by a moving boat.



DANGER FACTOR

A sting will cause blistering and scabs, and can lead to nausea, vomiting, muscle cramps and even breathing disorders.

Bell diameter: 10cm (4in)
Tentacle length: <10m (33ft)

Different types of nematocyst are found on all parts of the mauve stinger – not just the tentacles – so give it a wide berth!



How the sting works

Cnidocil

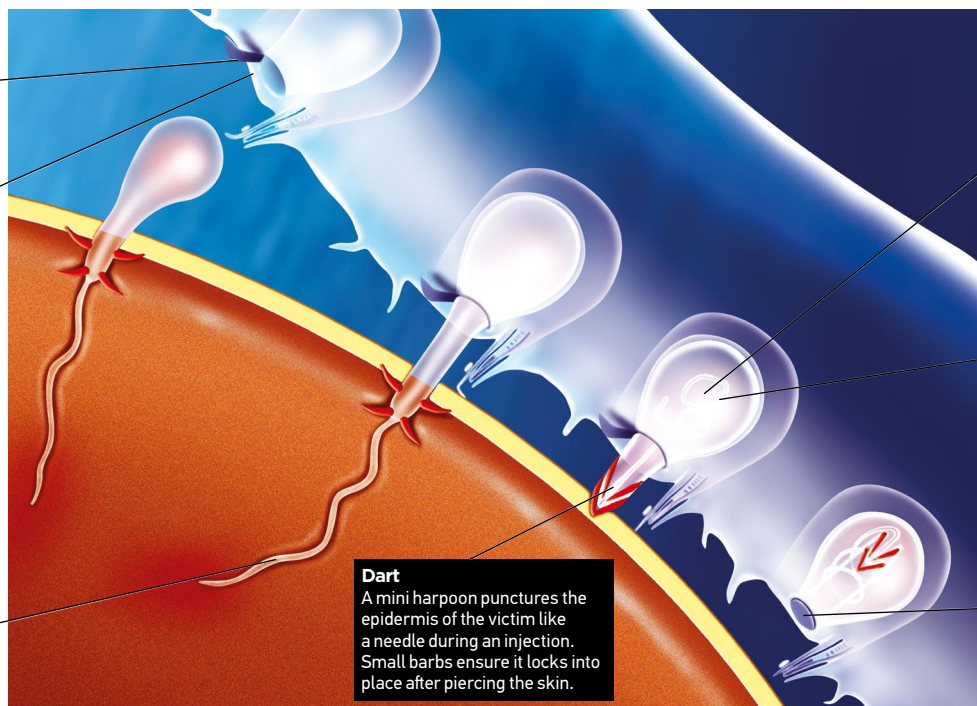
These sensory receptors sit on the surface and are primed to detect various stimuli, including movement, certain chemicals or a change in temperature.

Nematocyte

A jellyfish's tentacles – and sometimes its entire body – are lined with stinging cells that are used to both attack prey and defend against predators.

Tubule

A thread-like coiled tube attached to the dart unfurls to deliver the venom.



Dart

A mini harpoon punctures the epidermis of the victim like a needle during an injection. Small barbs ensure it locks into place after piercing the skin.

Capsule

Each nematocyst contains a shot of venom comprised of proteins that can enter and damage cells, and a range of neurotoxins. The specific formula varies across species, which is why some jellyfish are much deadlier than others.

Nematocyst

Inside the nematocyte is a toxin-bearing organelle composed of several parts, all of which are ejected at high speed when activated. It is sometimes known as the 'stinging organ'.

Operculum

The top of the nematocyte is covered by a trapdoor-like lid that springs open when a life form has been detected.

Man of war get their name from formidable galleons once used in sea battles, which their floats are said to closely resemble



DANGER FACTOR

Short-lived, intense pain and red welts on skin. On rare occasions, a sting can also trigger breathing difficulties and other allergic reactions.

Float length: 30cm (12in)
Tentacle length: <50m (164ft)

Portuguese man of war really do stick together

Although they may look like a jellyfish at first glance, Portuguese man of war – or blue bottles – are in fact a distant relative known as a siphonophore. What distinguishes these marine creatures is that they are not single organisms, but rather floating colonies made up of hundreds of individuals that perform different roles. While the float (also known as the airbag) is the most striking part of the community, it is the members below the surface tasked with defence and attack – the dactylozooids – that leave a lasting impression on us!

These particular polyps have evolved a superlong tentacle smothered with nematocysts, which work as a collective to make for a formidable weapon. It's the mind-boggling length these tentacles can reach – up to half a football pitch – that makes them such a high risk to us. They stretch so far from the main body that it's almost impossible to see them coming. Even after getting stung, there's a good chance you still won't be able to spot the culprit.

Jellyfish sting dos and don'ts

DO

- Rinse with saltwater
- Remove any clinging tentacles with tweezers/gloves
- Immerse in hot water or apply a heat pack
- Take painkillers if required
- Seek medical advice if pain is severe or you experience an allergic reaction

DON'T

- Rinse with fresh water
- Remove any tentacles with your bare hands
- Rub with a towel or sand
- Apply ice
- Urinate on it!





ANIMAL BODY LANGUAGE

Without the help of verbal communication, animal experts must read the minds of animals by studying and interpreting their every move

Words **Amy Grisdale**

It's hard to learn a language, even if you're surrounded by others that speak it fluently. So when it comes to understanding the language of animals it takes years of dedicated study, even with our closest relatives. Animal behaviour is a much more subtle language than the spoken word.

As a relatively recently evolved species ourselves it's important to understand that most animals emerged before humans, and verbal language is an extremely recent concept. While many species speak without words, they have entire languages that can be pieced together.

Jane Goodall spent over 55 years in the company of wild chimpanzees,

transforming their reputation from primitive beasts into social and sophisticated apes. Her observations included trades of complex body language that ranked and organised chimp troops into effective hunting teams.

While our ears and noses are fairly unremarkable, many animals manipulate body parts like this to convey messages. Carnivores, ungulates and rodents are just three examples that rely on this kind of communication, and as time progresses researchers are adding more species to the list. A surprising number of species are able to understand each other in ways that would bypass us completely.

Disappearing dog language

Once deadly hunters that ran wild in woods, modern-day dogs have lost much of their silent communication

It is believed that dog domestication may have started as far back as 36,000 years ago, but other studies suggest it could be as recent as 15,000 years ago. During this process dog behaviour was severely simplified.

While wolves relay information with minute changes in posture, facial expression and tail position, domestic dogs use a watered-down dialect without the full detail of their wild counterparts. What we now recognise as pets can still communicate this way though, especially if kept in groups rather than alone.

“Domestic dogs use a watered-down dialect without the full detail of their wild counterparts”

Canine conversation

Pet owners should learn to recognise the most important signals a pooch can give

Lip licks

This behaviour is supposed to appease a person or perceived threat. The dog tries to show it's not a threat and wants to be left alone. However, some dogs will do this when they are hungry. It's all about context.



Hackles up

The hairs along the backbone are called the hackles, and spring up when the dog experiences surprise or nervousness. It's an involuntary response, but dogs can recognise it in each other and respond appropriately.



Submissive tail

Tucking the tail between the back legs shows a dog is conceding to a human or another dog that has dominance. This makes the dog look smaller overall, and hides a vulnerable area that another dog could otherwise grasp in its jaws.



Playful pose

This is an invitation to play known as a bow. While the front limbs are flat to the ground the rear end stays firmly in the air. In wild wolves most play is confined to the first few years of life, but domestic dogs play throughout their lives.



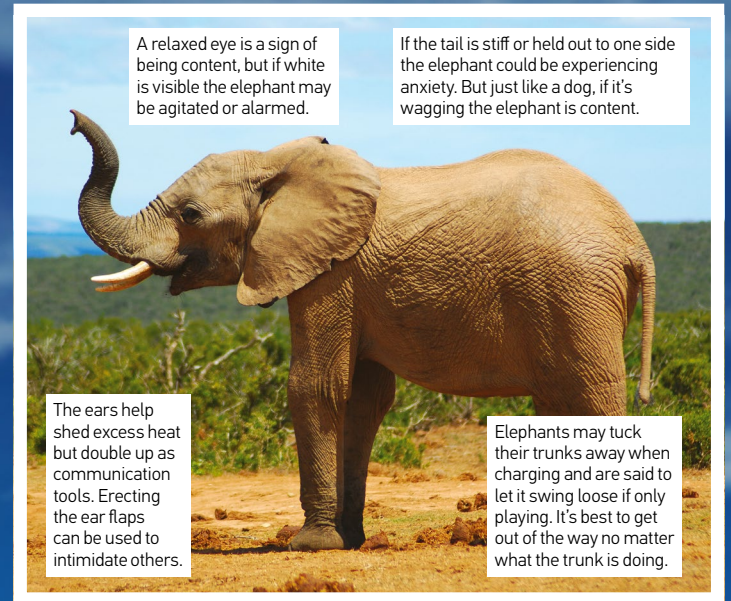
Elephant mime artists

Arguably some of the most intelligent animals on the planet, elephant communication is beyond words

With this species, body language is just the tip of the iceberg, and all types of elephant communication are intertwined. The bonds between related elephants can last a lifetime and family members are able to communicate with one another with the slightest of movements or a glancing touch.

Elephant experts even think the animals have a sense of slapstick humour. Elephants have been witnessed repeatedly play-charging at cars before stumbling comically, and researchers say it happens too often to be a real mistake. Elephants have a sense of self, and are perhaps entertaining themselves or others.

“Elephants have been witnessed repeatedly play-charging at cars before stumbling comically”



Aliens beneath the waves

Despite evolving to live in different mediums, dolphins and humans share some spooky similarities

Described by leading researchers as 'aliens' on our planet, dolphins are extraordinarily intelligent. Calves learn to recognise themselves in a mirror, and go through the same stages of mirror exploration as human children: first a playful response, then testing the mirror before self-directed behaviours into the mirror. Young dolphins wiggle and dance in front of a mirror like a giggling toddler might.

These marine mammals are also able to use basic tools. Like using an oven glove, bottlenose dolphins in Australia forage in rocky sand with a sponge clamped between their teeth. They're even conscious of their dental health. Bottlenose dolphins that drive fish to the shore of muddy swamps always lunge up the banks on the same side. This protects half of their teeth from erosion from the gritty mud.

The incredible thing is that this kind of behaviour varies from group to group. These bands of dolphins learn new life hacks and teach their young to do the same. They even have regional dialects. This is a fine example of animal culture, with traditions being handed down to new generations all over the globe, just like the beginnings of human society.

BELOW Bottlenoses have been seen creating bubble shapes with their blowholes before popping them



Apes of wrath

It's surprisingly difficult to understand our closest living relatives

The death of Harambe the gorilla in 2016 sent shock waves around the world after a three-year-old boy clambered into his enclosure. Many behaviourists agree that the boy was in danger, and the gorilla was displaying more than just play. The child escaped unharmed, but Harambe lost his life because his behaviour indicated increasing aggression.

Misinterpretation of behaviour can be a deadly mistake. A male western gorilla named Bokito escaped his enclosure at Diergaard Blijdorp Zoo in Rotterdam, the Netherlands, in 2007 following a perceived challenge by a regular visitor. A female guest 'bonded' with Bokito through the glass by holding his gaze and smiling up to four times a week, until the ape finally snapped. He scaled the enclosure walls and attacked the woman, leaving her alive but with severe injuries.

Direct eye contact may be helpful in an interview, but staring a male gorilla in the eye and displaying your teeth tells him that you question his dominance. Luckily, Bokito was tranquillised and returned to his reinforced enclosure, where he lives peacefully with his family.

This frightening display can be enough to prevent a fatal battle between great apes



The western lowland gorilla long before the incident



What Harambe was thinking

The split-second decision to shoot the silverback may have saved a human life, but opinion is divided about how both beings could have been saved

Zoo policy and legal proceedings aside, many behaviourists agree that the right decision was made in this case. Harambe's job, as a dominant male, was to protect his females from any potential threats.

What is seen in the video of the gorilla's interaction with the young boy could be Harambe testing the child by subjecting him to rough play. This may have been harmless in Harambe's eyes, but the boy was still at risk of injury no matter the ape's intentions.

However, there are historical cases of male gorillas protecting children that have entered enclosures, like Jambo of Durrell Wildlife Park in Jersey, UK. A fallen five-year-old boy was protected from the rest of the troop by the gentle gorilla until he was rescued.

Wild apes recognise their own young and form strong bonds with them. Males will even grab hold of an infant to prevent another adult from attacking it. In the end, the world will never know what could have happened if the fatal shot had not been fired, and Cincinnati Zoo may have faced global outcry no matter what the outcome.

“Male gorillas will even grab hold of an infant to prevent another adult from attacking it”

Animal body language



Mirror movement

Bottlenose dolphins are able to learn simply by watching others. This is known as observational learning and is something we do on a daily basis.



Corvid con artists

Ravens watch Egyptian vultures crack ostrich eggs with tools, then chase the birds off and enjoy the meal. They have learned to benefit from the tool use of the clever vultures.



Memory of a horse

Horses can perform tasks trained two years in the past without practice, and may have a memory span of up to ten years.



Octopus identity

Captive octopuses learn to recognise and respond to their own name. They even learn the identity of humans and squirt water at their least favourite.



I see you

Crows are able to follow the gaze of another bird to see what it is looking at. Only two other non-primate species can do this.



Pigeons are superstitious

Like humans that think two unrelated events can be connected, pigeons repeat behaviour they performed when being fed in the hope that this will cause another feeding session.



Family dining

Tamarin groups gather round food and share it like we might around a table. Parents and older siblings give food to the youngest infants even without the babies begging.



Breaking the barrier

A captive beluga whale called Noc spontaneously began to mimic human speech. This apparent attempt at communication with his keepers is still not entirely understood.

Just like you

So many animals display behaviour familiar to us, which is perhaps why we find them so fascinating to observe

The electric and venomous fish with stars in its sights

Despite being a master of camouflage, this upward-looking fish is a ferocious predator with a defensive arsenal including venom and electric shocks

They can generate electric shocks

Many stargazers are able to give a nasty electric shock when needed for defence, or to confuse prey. They do this using specialised organs, which are either derived from modified eye muscles or sonic muscles. Depending upon the temperature of the water at the time, stargazers can deliver a jolt of up to 50 volts.

They have two venomous spines

Stargazers are among the most venomous fish in the ocean, an accolade they share with stonefish, lionfish and pufferfish. The long, venomous spines found above the stargazer's pectoral fins are used to defend themselves from predators, and they have even been known to give fishermen a painful sting.

RETICULATE STARGAZER
Dactyloscopus foraminosus
Class Actinopterygii



Territory Florida and the Atlantic coast of Brazil

Diet Invertebrates such as crabs, squid and octopus, as well as other fish

Lifespan Variable, but usually around 5-6 years

Adult weight 2-9kg (4.4-19.8lb)

Conservation Status



LEAST CONCERN

They have confusing common names

Despite their rather grand name, reticulate stargazers are a relatively plain brown colour with net-like (reticulated) markings on their scales. Many stargazers look similar, and so several different species have ended up with the same common name.

They expertly ambush their prey

The position of their eyes allows stargazers to partly bury themselves under the sand and still watch for prey. When a fish unwittingly swims overhead, the stargazer lurches up to catch it. Some stargazers even have a worm-shaped lure hanging from the roof of their mouth.

They're a family of sky-watchers

There are around 50 species of stargazer, grouped into the Uranoscopidae family. The name stargazer comes from its Greek family name, as ourannos means 'sky' and skopein means 'to watch'. True to their name, all the fish in this family have top-mounted eyes.

Endangered Chinchilla

CHINCHILLA

Chinchilla lanigera

Class Mammalia



Territory Andes mountains, South America

Diet Grasses, leaves and twigs

Lifespan 10 years

Adult weight Short-tailed:

1.1-1.4kg (2.4-3lb)

Long-tailed: 370g-490g (13-17oz)

Conservation Status



ENDANGERED

Though domesticated and found in homes around the world, in the wild chinchillas are dangerously close to extinction. The two extant species of this adorable rodent can be found in very limited numbers across their Andes habitats, though they are now primarily concentrated in Chile. Hunted relentlessly for their silky soft fur (the second-thickest of any mammal), they were

thought extinct in the wild until a small population was discovered in the mid-1970s. The fight is now on to bring the wild chinchilla back from the brink.

The causes of extinction

Habitat erosion

The human-led destruction of the chinchilla's mountainous habitat has been one of the major factors in the decline of its population. Mining throughout the Andes, and the introduction of grazing animals in particular, has left chinchillas with very few places to go, while devastating their sources of food.

Hunting

For centuries chinchillas have been prized for their incredibly soft fur. Though it is now outlawed, the hunting trade peaked in the 19th century, when millions of the rodents were killed to create luxurious garments – the fur of up to 100 chinchillas can be used to produce just a single coat.

Removal

While hunting is less common now, chinchillas still risk being removed from their natural habitat for illicit breeding purposes. The demand for chinchilla fur remains high, while they have also become popular around the world as pets, increasing their value to opportunistic poachers who are willing to track them down.

What you can do


WWW.WILDCHINCHILLAS.ORG

Save the Wild Chinchillas is always looking for new members, donations and volunteers to help spread the word about their cause and restore as much habitat as possible for South America's wild chinchillas.



Decreasing numbers

Both varieties of chinchilla can still be found scattered throughout the Andes, but now more than half the wild population is restricted to the Reserva Nacional Las Chinchillas in Auco, Chile.

 Current population range



A global conservation effort

Avid conservationist Amy Lorraine Deane helped start Save the Wild Chinchillas, a not-for-profit organisation that has spent the last 20 years trying to ensure these creatures do not become extinct.

Save the Wild Chinchillas is a conservation organisation aiming to restore essential habitat for endangered chinchillas while deterring further habitat degradation.

Our main objectives are to educate and involve people worldwide in conservation, promote habitat regeneration, and create a knowledge base. We work directly with the local community, focusing on creating and enhancing habitats for chinchillas on communal lands. Seeds are collected from mountains, germinated in our modest nursery, and then the seedlings are transplanted into restoration areas. To date we have raised and transplanted 6,500 plants.

In areas where we work, wild populations have increased by two- and three-fold, however these areas are located outside of protected lands. Although we work outside the National Chinchilla Reserve, we support it by compiling reports, conducting scientific training for the guards and sharing field supplies. Our current educational campaign is focused on awakening conservation ethics in the policy makers of Chile.

Our partnership with the local community has strengthened our knowledge and has led to their growing support for local and global conservation too. We are proud to say that people from Africa, Asia, Australia, Europe and North and South America have aided in our achievements, so that one day we may ensure a future where wild chinchillas are able to roam freely in their natural habitat.

“One day we may ensure a future where wild chinchillas can roam freely”

Wildlife photography

Create shots with impact

Pro photographers tell us about their recent projects and how you too can get shots that stand out

Camera consideration

"These birds were a lot more tolerant of humans than probably the majority of peregrine falcons in existence. In the UK peregrines are Schedule 1 species, which means you'd need a special licence to be within 100 metres (328 feet) of a nest. Even in places where you don't need a licence you should be incredibly careful about how you approach any species, and always remember getting a photograph should never come before the species' welfare."



"This was shot at 1/2000sec, f11 and ISO1600. The fast shutter speed was used to freeze the action with a large aperture to get a wider depth of field."

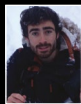
"It was so important to not just get the birds but show a bit of the location also, so I had to keep that in mind. I also didn't want Linda [the falcon] dominating the frame, so I stood towards the end of the balcony to get the shot as she came in."

"I had to get my focus just right and shoot a number of frames over a short period of time to get the sequence so I could get the wings coming out as she put the brakes on."





Luke Massey
WWW.LMASSEYIMAGES.COM



Wildlife photographer
Luke was awarded Young
Environmental Photographer
of the Year 2016, and also
won an award from the 2016
Wildlife Photographer of the Year awards in
the Urban Wildlife category.

Camera used: Canon EOS-1D X

Telling a story through photos

Luke Massey talks to us about his project High-Rise Falcons

Photography can be incredibly important for getting across certain messages, and it can be especially effective at telling stories about the wildlife around us. "People all work in different ways, but with social media taking over most people's lives, I think photography is only gaining power," believes pro wildlife photographer Luke Massey.

"People – whether they actually are or not – seem too busy to read articles. However, if an image flashes up in front of them it can make them think twice and immediately grab their attention."

The types of shots that tell you a story often have more impact than simple portrait shots that give you no context. Massey's High-Rise Falcon series, for instance, paints an interesting picture of the behaviour of a group of birds as they settled in an unusual location.

"30 years ago peregrines were extirpated in Illinois; now 21 pairs nest in Chicago alone. I found out about one of these pairs that had decided to nest in a flowerpot on a condo balcony, 28 floors

above Chicago. The pair were incredibly tolerant and allowed me to document a wild peregrine nest in a way no one had ever had access to before. Linda, the female, was the boss and spent most of her time around the nest, while Steve, the male, would be out hunting."

So how exactly did he go about getting across this unique story? "Instead of constantly taking tight shots I wanted to show the background to highlight that this wasn't just any peregrine nest (eyrie): it was right in the centre of a city. I think by having the buildings in the background that shows how urban this nest is. Especially when you think a 'normal' nest should be on a cliff face in the middle of nowhere!"

Giving your wildlife images some context and placing them in their environment is one of the easiest ways of communicating something about them to the viewer. To do this, use a wide-angle lens and consider your shooting position to get the best background for the shot.





Shooting a wildlife project

Ben Cherry tells us about the epic expedition Flight of the Swans

You can really add impact to your images by including them as part of a series that paints a bigger picture, but to do this you need to be committed. Someone who knows this well is Ben Cherry. We spoke to him about his work documenting Flight of the Swans.

This was an out-of-the box project by the Wildfowl Wetlands Trust, which aimed to raise awareness of the declining Bewick's swan and shrinking wetlands throughout Europe. Cherry had the pleasure of photographing along the flyway as conservationist Sacha Dench took flight alongside the swans on their migration. She was, however, powered only by a paramotor (a small parachute strapped to a propeller engine) as she glided through the air.

When starting a project, it's important to know what you're setting out to achieve. "[We wanted it to] start conversations," says Cherry, "from school visits to interactions with hunters and politicians. Flight of the Swans has ignited conversations throughout the flyway, and has brought together conservation bodies to hopefully work more cohesively in the future."

Photographing a wildlife project that can affect change is very challenging, but also extremely fulfilling. "Coming across Bewicks that were filmable in the Gulf of Finland was a really special moment for the wildlife crew getting to know the birds. We were then treated to an extraordinary lake in Germany where we

found 1,000 Bewick's in one place; our previous highest number was 17!

But the most meaningful moment was returning to Kihnu Island after ten days, going from an autumnal scene with Bewick's, whoopers and mute swans present, to a harsh wintery scene with only mutes remaining, highlighting why these species migrate – it's life or death."

When documenting this huge project, however, it was also important not to disturb the species. "The swans have a few tell-tale signs – they would call and bob their heads when something was bothering them, from a predator to an onlooker who had got too close. We would use this as a gauge and then let the swans become accustomed to our presence."

Photographing a project that requires a lot of travel restricts the amount of kit you can take, so you really need to think about what you'll need. Having kit that you are familiar with will also help as you won't miss key moments because you're working out your settings. Cherry opted for a lightweight mirrorless option.

"I was photographing the project with the Fujifilm X-Series, particularly the new X-T2. It was the best option for space and weight, and allowed me to share images via my phone."

Equally as important to getting key shots is having a plan in place of what you're looking to achieve. Ongoing projects like this, though,

also require you to adapt and move with the situation you are faced with, so you often have to be prepared to change tactics quickly.

"Other than a handful of situations, it was all about adapting to the birds. With a physical barrier like water, it meant that I had to maximise situations – using a burst mode and tracking autofocus allowed me to photograph the swans as they would take off or land."

If you're thinking of starting your own ongoing photo project, Cherry suggests sticking with something local to start with. This means you'll be able to revisit the location easily, letting you paint the picture from start to finish, as well as go at key times when the light is just right.

"Time is the most important factor with wildlife photography, so the more you can put into a project, the more you will eventually get out of it. Utilise local knowledge, find wardens, visit local reserves and get tips for the best places to go. Another nice idea would be to create a project around a local reserve, or even better a local conservationist, highlighting the interaction between humans and nature."

Ben Cherry
WWW.BENCHERRYPHOTOS.COM



Ben is an environmental photojournalist and also a Fujifilm X-Photographer with a focus on highlighting the beauty of the natural world.

Camera used: Fujifilm X-T2

Diary of Flight of the Swans

Key events Ben documented from the expedition



24.09.16 Reuniting with the team

Sacha finds the ground team after crossing the tundra without their support. Bewick's come to this barren land each summer to breed.



16.10.16 Challenges occur

Sacha dislocates her knee while taking off, so a trike is fashioned so she doesn't stress her legs during landing. For the rest of the time she has to wear this knee support.



06.11.16 Harsh weather hits

The weather turns on the crew who are heading to Estonia, as something is wrong with Charlotte [one of the tracked swans]. Blizzards prevent us from finding her.



25.11.16 Bean geese take flight

Thousands of bean geese take off from a roosting lake in Germany. There were around 1,000 Bewick's, but the number of bean geese overwhelmed the view.



05.12.16 Channel crossing

Sacha, in her dry suit and floats attached to her trike, takes off from Calais and heads to the UK over the channel. The first woman to cross the channel via paramotor.

"The project required a lot of thought, dedication and patience. Thankfully we had a fantastic team who were up for the challenge"

@ Ben Cherry



Capturing behaviour close-up

John Humphrey on how he shot the action in this fantastic macro image

One way to create a wildlife shot with impact is to use macro techniques to zoom in on a creature we don't often get to see in detail. If you can also capture something about their behaviour that often goes unseen then you really do have an interesting photo. We spoke to John Humphrey about this fantastic shot of leafcutter ants for his insight into this process.

"This picture was taken at St Albans Butterfly World (now sadly closed, hopefully to reopen at some time)," says Humphrey. "One of the attractions is an ant house in which leafcutter ants transport leaves into their nest by crossing a rope bridge. I was asked to take some photographs of the ants in action to use on the Butterfly World website.

My requirements were pretty simple. I wanted a picture with more than one ant, all moving in the same direction, all in sharp focus, with at least one carrying a leaf. However, ants do not pose for photos and I took hundreds before getting a few that met the criteria."

How exactly then did he go about capturing the behaviour of these ants close-up while keeping their movements frozen?

"Leafcutter ants are a nightmare to photograph! As well as being very small, they are in constant fast motion. The lighting in the area is designed to suit the ants, not the photographer, so I realised that I would have to use flash lighting to give sufficient light for the photographs and freeze the ants' movement.

My main concern was to find a position that would enable me to get close to the ants and avoid taking pictures through the glass side of their enclosure. This involved a rather precarious positioning on top of a stepladder. Butterfly World kindly allowed access out of hours to avoid getting in the public's way."

The key to macro shooting is to have a lens that allows you to focus up close. Macro lenses will have very small depths of field, so you have to be very accurate.

"The camera body was a single lens reflex Canon EOS 5D Mk III; the lens was the Canon MP-E65 lens, which delivers up to five times magnification; and the ring flash was Canon's Macro Ring Lite MR-14EX. The MP-E65 lens cannot be conventionally focused. You need to be in the right position to focus the image."



Top tips for macro shots

John Humphrey's best advice for getting up close

Macro photography involves shooting small subjects at high magnification. This presents two challenges. First, as well as the subject being magnified, so are its movements, which will blur the image unless everything can be kept still or fast shutter speeds can be used. Then there is the depth of field, which will be shallow, so the point of focus must be precisely controlled. Here are some handy tips.



Keep stable

Whenever possible, mount the camera on a tripod to minimise camera shake. If a tripod is impractical – perhaps because you are tracking a moving subject – then try to stabilise your own position by leaning into a solid support such as a tree or wall.



Stay focused

If your camera is set to auto-focus it's likely to focus on the wrong part. It's often best to switch the camera to manual focus and to use live-view on the screen to observe focus in fine detail. If photographing a small creature, then the point of focus should be on the eye closest to the camera.



Create good lighting

To obtain the ideal combination of a small aperture (to give best depth of field) and a fast shutter speed (to freeze movement), you will need a lot of light. Ideal lighting for macro work is a ring flash. This uniformly lights the subject and provides high levels of subject illumination.

John Humphrey
WWW.JOHNHUMPHREY.UK



John is a Fellow of the Royal Photographic Society and an expert in close-up and macro photography. His book *Close-up and Macro Photography* is available from The Crowood Press.

Camera used: Canon EOS 5D Mk III

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18-21 MARCH 2017
THE NEC, BIRMINGHAM

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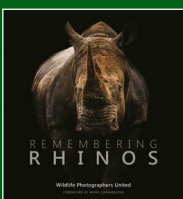
Help raise funds for rhinos

Remembering Rhinos is the follow up to the hugely successful Remembering Elephants book, which raised over £130,000 in 2016 to fight elephant poaching. Many of the world's top wildlife photographers will contribute once again in order to raise funds and awareness.

Founder Margot Raggett has declared her aim is to make "the most beautiful book on the species ever produced." A Kickstarter campaign is currently underway until 12 March to pre-fund the printing and production and the book can be pre-ordered there for £40 plus

postage. The launch date will be on 30 October 2017.

For more information head over to rememberingrhinos.com and show your support for the cause.

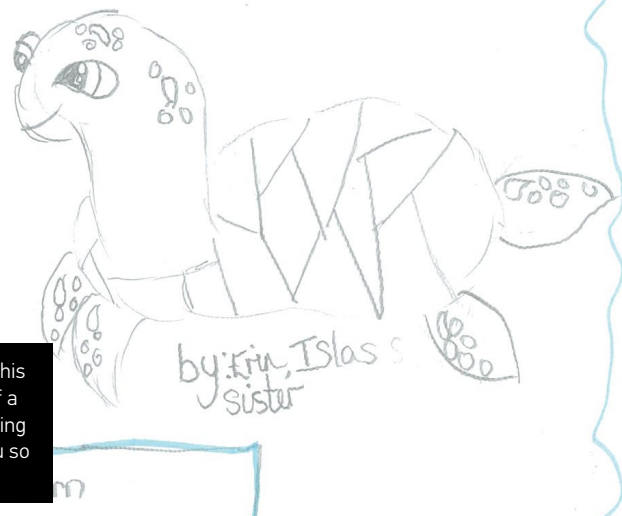


Dear the team of world of animals,

I have just got this for Christmas and I would love to ask you some questions about some of the animals. Do you have sea turtles? My friend would really want to know because she loves them. They're her favourite animal I think. How many sea animals are there? From Isla mclaggan age:10



Thanks to ten-year-old Isla Mclaggan for this lovely letter, and the wonderful drawing of a sea turtle by her sister, Erin. We'll be sending Isla a copy of the magazine as a thank you so she can read all about sea turtles!



STAR LETTER

Superpower dogs update

Halo and her handler Cat are hard at work training to be search and rescue superheroes. We caught a moment with them in between trips to the rubble pile for a quick update!

How are things going for Halo?

Things have been going well! We are going to leave here in a little while to go to Jacksonville for the weekend to train. Halo is still on the pile; we are getting better at finding one victim and we are still making the second victim very motivational. I tried to challenge her last week where I put two people on the pile and she found the first one fine, but the second one wasn't as successful as I wanted, so I had to work on motivating her.

How do you motivate Halo to find person number two?

I give her more of a visual push, like waving her toy, getting her excited and focused on the person hiding in the tube. They will wave and call her name and bang on the door. Then I release her and when she's on her way they will shut the lid (of the tube). As soon as she gets to that lid and puts her nose in the hole and starts to bark, she gets rewarded with her tug toy. As she progresses she's going to know that there's going to be more than one victim so she has to continue using her nose and weed out the audible and visual clues.

Has your training regime changed much?

Now that it's winter and a bit cooler outside we

have been doing much more training. I'm trying to vary it so we can travel and train in different places. This is our second trip to Jacksonville coming up and we were in New York recently, as well as Virginia Beach soon. It's important because if there's a disaster, she's got to travel to get there. I need to make sure that she knows that when she's travelling, she's going to go on to rubble that's unknown to her and she's got to work. So I put her in as many situations as possible: on planes, in different climates, different areas.

And how is she doing at home?

She hasn't grown up much! She considers my husband her playmate so she's very different with him, and he lets her get away with a lot! But with me she's a little bit better. She's getting there, but she'll be a puppy for around another year yet, with her tendencies.



To find out more about Halo and the Superpower Dogs film visit animalanswers.co.uk

Wildlife journeys

The pug and the cat that walked across Spain

Readers Sebastian and Finn tell us about walking 1,500km (932mi) with their pets

In 2015, we realised we were not living our dream anymore, so we sold our belongings and gave notice on our apartment. The plan was to walk across Spain, taking everything we owned, most importantly Bandito the pug and Luigi the cat.

Following the historic Camino to Santiago route, a pilgrimage from the north of Spain to the Sierra Nevada Mountains, our journey quickly became a hit on social media as the first people to do it with their pets. Crossing plateaus, forests and the Spanish plains in all types of weather made for an epic journey, one that has attracted attention for upcoming books and merchandise.

Since completing the walk, we now lead a simple life in our home just outside Marbella. Follow us on Instagram @pugandcat or visit www.pugandcat.com to find out more!



Tell us about one of your wildlife holidays by emailing your story and photos to animals@animalanswers.co.uk

Animal antics this month

Our favourite animal news and stories. Let us know yours at animals@animalanswers.co.uk

Animal News Tilikum dies

In January SeaWorld announced that Tilikum, the orca that killed his trainer in 2010 at SeaWorld Orlando, had died. Aged 36, Tilikum had health issues but the cause of death was not given. Tilikum was linked to two other deaths in 1991 and 1999. Keeping orcas captive is highly controversial.



Animal calendar Amazing animal images

If you've forgotten to buy your 2017 calendar, check out this awesome calendar featuring images from wildlife photographer Andy Rouse. For every copy sold Andy is giving £1 to tiger conservation through 21st Century Tiger.



Animals on film Go and see Sing

Have you watched any animal films recently? We've just been to see *Sing*, starring Matthew McConaughey as a koala called Buster Moon who stages a talent show. A fun family film for your animal-loving kids and even for us adults too!



© LOUIS JOHNNY/SIPA/REX/Shutterstock, Denise Eriksson, Andy Rouse, Milan Beers

Reader photos

These two male polar bears were enjoying a play fight while waiting for the Hudson Bay to freeze over



A mother polar bear with her cub very close to the tundra buggy



Thanks to Annie Hayes-Watkins for sending in these photos of polar bears in Canada

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Animal answers

Send your animal questions to us at:
questions@animalanswers.co.uk



What is the biggest animal that can fly?

It depends on what you mean by 'big'. The heaviest flying creature alive today is the kori bustard, weighing in at 18 kilograms (40 pounds) and with a wingspan of 2.8 metres (nine feet). However, it is not generally considered the largest. That title typically goes to a South American vulture called the Andean condor. Males can weigh as much as 15 kilograms (33

pounds) and have a wingspan of up to 3.2 metres (10.5 feet).

Both these birds are tiny in comparison to some of the flying creatures of the past. The now extinct *Quetzalcoatlus northropi*, a reptile that lived 68 million years ago, had a wingspan of 10.4 metres (34 feet) and weighed between 200 and 260 kilograms (441 and 573 pounds).

Andean condors can live for up to around 60 years in the wild



Which animal has the sharpest eyesight?

Birds of prey, such as eagles, hawks and buzzards, have the sharpest eyesight in the animal kingdom. It is thought to be up to eight-times sharper than human vision, enabling them to spot prey from 1.5 kilometres (0.93 miles) away.

This is partly because their eyes are especially large for the size of their heads and feature five times as many light sensitive cells as ours do, allowing them to see objects in much greater detail. They also have special muscles surrounding their eyes that cause the lens to curve, making it possible for them to adjust their focus as their prey moves.

In addition, their superior colour vision means they are capable of discriminating between more shades and can see ultraviolet light, which is invisible to the human eye. This enables them to spot the urine trails of small prey as they reflect UV light, leading the birds to their next meal.

Do animals not need to clean their teeth?

Some animals do clean their teeth, they just don't need a toothbrush to do it. For example, cows keep their teeth healthy by chewing grass, while elephants brush their tusks (which are actually modified incisors) by using them to chisel tree bark.

However, most animals don't have much of a problem with dental hygiene because of their diet. Humans suffer from tooth decay because we eat foods that are rich in refined sugars, but animals don't

come across these in the wild.

Some pet foods do contain sugar, so a regular tooth clean may be required for your pets, but the high pH value of canine and feline saliva means they are less susceptible to cavities.

Often the relatively short lifespan of animals mean that they don't live long enough to suffer from dental damage. Or, in the case of sharks and crocodiles, their teeth don't last long enough as they regularly replace them throughout their lives.

Crocodiles can get through up to 8,000 teeth in a lifetime



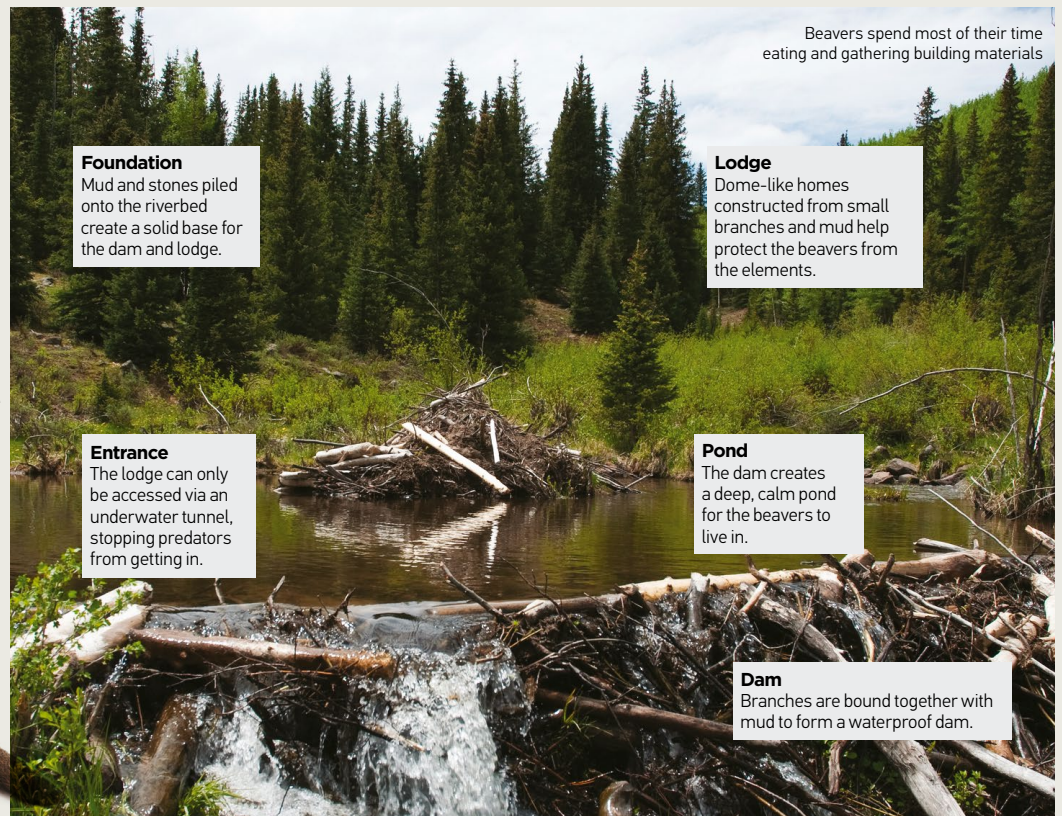
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Why do beavers build dams?

Beavers are one of nature's greatest engineers and can build dams that are up to three metres high (ten feet) and 500 metres (1,640 feet) long.

They busy themselves with these mammoth construction tasks for protection, as dams help to create a safe space for them to build their homes. First they build up the riverbed using mud and stones, then pile branches and mud on top to form a dam. This creates a calm pond in which they can construct a dome-shaped home called a lodge.

As they are built on small islands above the water level these homes are safe and dry, and can only be accessed by swimming through a tunnel, meaning they are out of reach to most predators.



Foundation

Mud and stones piled onto the riverbed create a solid base for the dam and lodge.

Lodge

Dome-like homes constructed from small branches and mud help protect the beavers from the elements.

Entrance

The lodge can only be accessed via an underwater tunnel, stopping predators from getting in.

Pond

The dam creates a deep, calm pond for the beavers to live in.

Dam

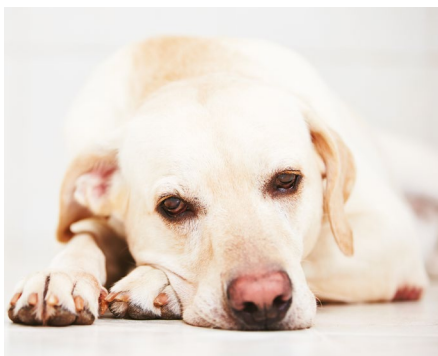
Branches are bound together with mud to form a waterproof dam.

Are there any animals that commit suicide?

There are many cases of animals killing themselves, but whether they can be classed as suicides is up for debate. Suicide is considered to be the act of killing oneself intentionally, but it is difficult to know if an animal knows its actions will result in its own death.

For example, there have been cases of dogs becoming depressed and stopping eating when their owner dies, or distressed whales beaching themselves, but they may not be aware that these actions will end their lives. Other creatures appear to sacrifice themselves for the good of the species, such as the exploding ants that destroy themselves and the enemy when threatened, or the female spiders that allow their young to eat them.

However, it is likely that these are simply natural responses to environmental triggers, rather than conscious decisions to die. Meanwhile other animals are simply made to kill themselves, as parasites infect their minds and alter their behaviours, steering them towards certain death.



How are whales born?

Whales are mammals, just like humans, and so they have live births after a period of gestation. Baby whales (called calves) remain in their mother's womb for between nine and 18 months, depending on the species, and are then born underwater.

They emerge from their mother tail-first to prevent drowning, and can swim straight away, enabling them to get to the surface to breathe.

Although they are already well developed – some may be a third of the length of their parents at birth – calves remain with their mother for between six months to two years.

During this time they suckle on her nipples, which produce milk that is full of the nutrients the calf needs to grow. Once the mother stops producing milk, the young whale will switch to eating solid food and become independent. When it reaches sexual maturity, which is usually between the ages of five and 20, it will produce young of its own.

Female whales, known as cows, give birth to a single offspring every one to six years. Many species migrate to warmer oceans to breed, and will mate with more than one male to increase their chances of producing healthy offspring.



Female whales nurse their calves for between six to 24 months

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Quinkana

This giant crocodile stalked parts of Australia long after the dinosaurs had died out, until it met its own, mysterious fate



Apex predator

The size of the biggest species would have put it right at the top of the food chain.

On the run

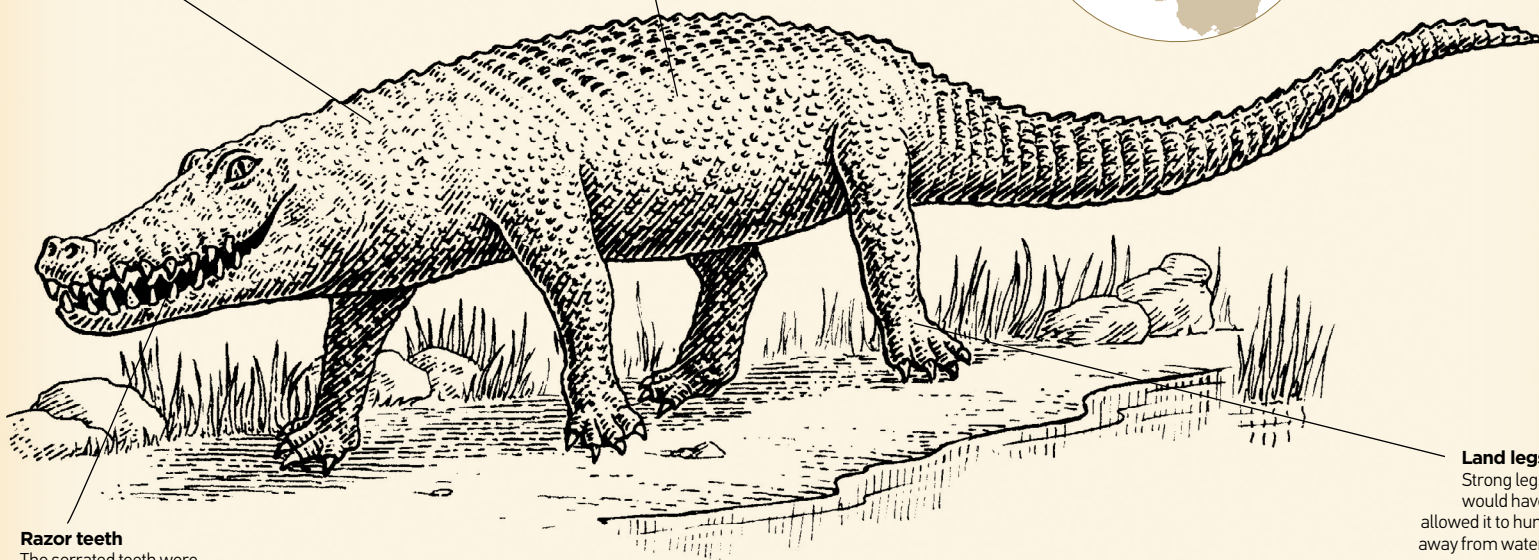
Because its belly wasn't dragging on the ground, it might have moved quickly across land.

Razor teeth

The serrated teeth were adapted to cutting flesh rather than drowning prey like modern crocodiles.

Land legs

Strong legs would have allowed it to hunt away from water.



Australia is renowned for being home to several species that evolved unusual variations on ecological traits we see in animals elsewhere. Marsupials and monotremes are famous examples, but the continent's history of biological oddities doesn't only consist of mammals.

The quinkana, a prehistoric crocodilian, was another product of unusual evolution down under. Sadly, it became extinct long before we could properly understand its rightful place on the reptile family tree.

Fossilised remains of what are thought to be at least four species of quinkana have been found in Queensland. By dating these, scientists have concluded that the quinkana occupied parts of the state during the Pleistocene era (2.6 million to 11,700 years ago).

This period is associated with megafauna: land animals that typically grew to larger sizes than we see in similar organisms now. The term would easily apply to the largest species of quinkana: it

could have been around six metres (19.7 feet) in length and as tall as an adult human.

Reconstructions of quinkana skeletons have indicated that it had an elongated body like a modern crocodile or alligator. In contrast to its extant relatives, though, a quinkana appears to have had flattened, serrated teeth and longer legs that lifted its torso clear of the ground. Taken together, these traits suggest that it had a largely land-based lifestyle rather than the aquatic habits associated with today's crocodilians.

It's not known why the quinkana went extinct. Like other Pleistocene fauna, it might have fallen victim to variable climate conditions. Humans could have played a role too. Anthropologists estimate that people colonised Australia around 50,000 years ago. As top predators, quinkana might have been a threat to these early settlers. If so, they were possibly killed for food or in self-defence. However, the human contribution to Pleistocene extinctions is debated.

Last seen...

Date: Unknown

Location: Queensland, Australia

Quinkana share their name with mythical spirits called quinkans, which appear in aboriginal rock paintings near the town of Laura in Queensland. Estimates suggest that these paintings are around 40,000 years old, but nothing in them shows that humans encountered this fearsome reptile. The quinkana was given its name much more recently. The type specimen is credited to Ralph Molnar and his 1981 paper on the Pleistocene crocodilians of Queensland.

"The quinkana had flattened, serrated teeth"

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World of Animals

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Distributed in the UK, Eire & the Rest of the World by

Marketforce, 5 Churchill Place, Canary Wharf, London, E14 5HU

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ISSN 2053-7727

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