NEW

World of Animals

BOOK OF

BIG CATS & AFRICAN WILDLIFE

FROM THE ZEBRA TO THE AMUR LEOPARD

Digital Edition

FUTURE

FIFTH EDITION

Welcome to

World of Animals™

BOOK OF

BIG CATS & AFRICAN WILDLIFE

Tread carefully into the world of big cats, and stare into the yellow eyes of a killer as we track down incredible predators like the Amur leopard, the characteristic Eurasian lynx, and the enigmatic black panther. We travel from the snowy mountains of Central Asia to urban areas of Northern America to discover what goes bump in the night, with beautiful illustrations and photography of the most elusive members of the big cat family. In the second part of this book we take you on a safari to the heart of Africa to meet the most iconic creatures, from the flamboyant flamingo to the regal rhino. We'll also unveil secrets for the ultimate trips to Zambia and Ethiopia, so you can get up close and personal with these animals yourself.

World of Animals BOOK OF BIG CATS & AFRICAN WILDLIFE

Future PLC Richmond House, 33 Richmond Hill,
Bournemouth, Dorset, BH2 6EZ

Editorial
Editor **Rebecca Greig**
Designer **Briony Duguid**
Editorial Director **Jon White**
Senior Art Editor **Andy Downes**

Cover images
Dreamstime, FLPA, Thinkstock

Photography
All copyrights and trademarks are recognised and respected

Advertising
Media packs are available on request
Commercial Director **Clare Dove**
clare.dove@futurenet.com

International
International Licensing Director **Matt Ellis**
matt.ellis@futurenet.com

Circulation
Head of Newstrade **Tim Mathers**

Production
Head of Production **Mark Constance**
Production Project Manager **Clare Scott**
Advertising Production Manager **Joanne Crosby**
Digital Editions Controller **Jason Hudson**
Production Managers **Keely Miller, Nola Cokely,**
Vivienne Calvert, Fran Twentyman

Management
Chief Content Officer **Aaron Asadi**
Commercial Finance Director **Dan Jotcham**
Head of Art & Design **Greg Whitaker**

Printed by William Gibbons, 26 Planetary Road,
Willenhall, West Midlands, WV13 3XT

Distributed by Marketforce, 5 Churchill Place, Canary Wharf, London, E14 5HU
www.marketforce.co.uk Tel: 0203 787 9001

World of Animals Book of Big Cats & African Wildlife Fifth Edition

Future plc is a public company quoted on the London Stock Exchange (symbol: FUTR)
www.futureplc.com

Chief executive **Zillah Byng-Thorne**
Chairman **Richard Huntingford**
Chief financial officer **Penny Ladkin-Brand**

Tel +44 (0)1225 442 244

Part of the World of Animals bookazine series

Contents

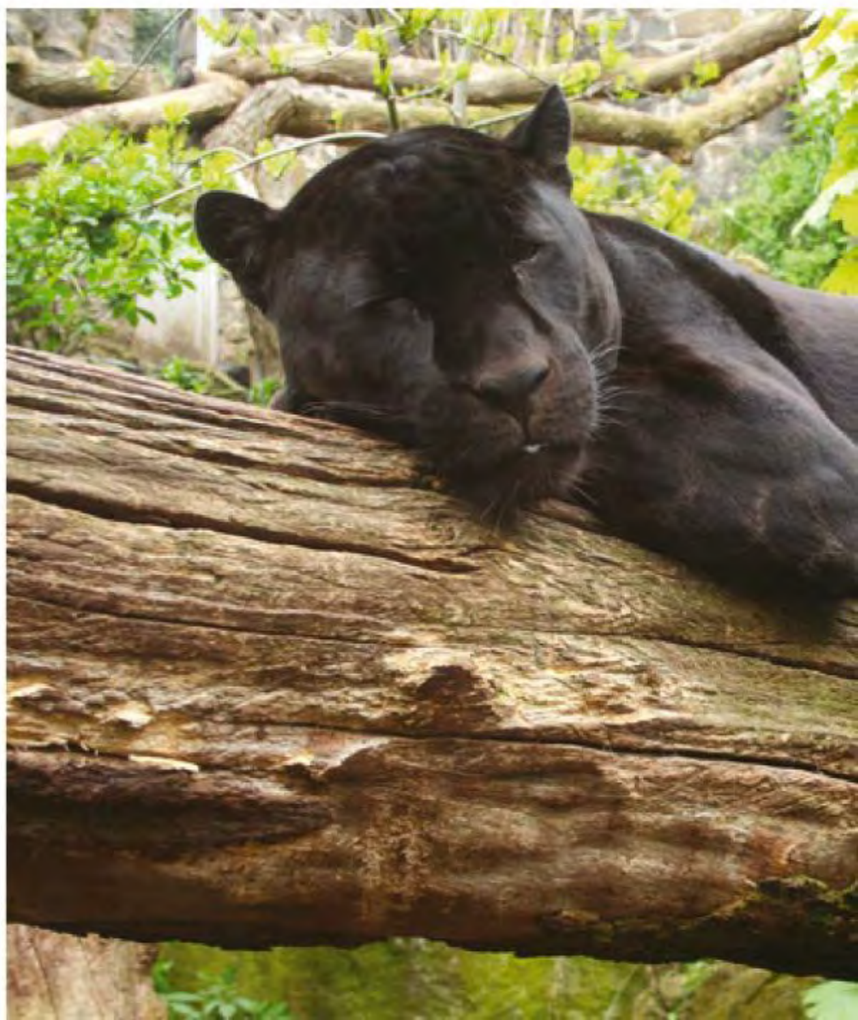
Big Cats

African Wildlife

Big Cats

From African plains to frozen tundras, big cats have learned to thrive and keep their cozy spot at the top of the food chain – get close to these amazing felines here

Big Cats



80

Big Cats

WILD CATS OF THE WORLD

As stealthy as ninjas, as strong and fierce as the best predator out there and with breathtaking beauty to boot, the felines are an incredible bunch

Big cats are a superior group of animals. They're intense predators, all carnivorous meat-eaters and none of them take prisoners. Whether that's a gigantic male Siberian tiger weighing 300 kilograms (660 pounds), or a tiny black-footed kitten weighing just a few kilos, each cat has a 'don't-mess' attitude about it that has ensured it a spot at the top of the food chain for thousands of years.

Despite their differences in size and appearance, all big cats have similar characteristics that make them so recognizable and iconic. Lithe, muscular bodies, pointy ears, slit-like luminous eyes, pointy teeth and the incredible ability to land on their feet are just some of the classic cat attributes found in every member of the feline family.

The big cat all-stars

Check out the fastest, strongest and most powerful felines around

All the members of the family 'felidae', from the one curled up on your lap to the most majestic lion king in the Serengeti, share some common characteristics. However the felidae also has members that are incredibly diverse, and ones that can show off some truly awesome talents. Here are some of the cat family's biggest and best...

Cheetah
Found across Africa's plains and grasslands, cheetahs are the fastest thing on four legs, or in the animal kingdom for that matter. These speedy, spotted cats can go from 0-60 miles per hour (0-96 kilometres per hour) in just three seconds. They are agile and nimble at speed, able to make quick turns in order to snare their prey.

Eurasian lynx
As one of the most distinctive big cat species, the Eurasian lynx sports a thick fluffy coat with attractive ear tufts. Found in the forests of western Europe, Russia and central Asia, the lynx is a super stealthy hunter and can use its effortless agility to track down large prey.

Black jaguar
Found across South America, the black jaguar plays a large part in ancient culture. The name jaguar is derived from the Native American word *yaguar*, which means 'he who kills with one leap'. These big cats will sometimes climb trees and lie in wait in order to ambush their unsuspecting prey. Although many of these cats appear to be pure black, on closer inspection you'll see that they actually have spots.

Snow leopard
Found far away from their warm-weather namesakes, snow leopards live high up in the mountains of Central Asia. Their fur is a greyish-white to camouflage them against the chilly backdrop and their wide, fluffy paws function as excellent snowshoes. A long, agile tail also helps the leopard to keep balance as it leaps from icy cliff top to rocky crag.

Tiger
The majestic tiger is one of the most distinctive big cats, with its thick coat of sumptuous stripes. Unlike many of its cousins, Tigers enjoy a swim, and they are as acute a predator in water as they are on land. Powerful and muscly, a tiger can easily stalk and ambush large prey.

Clouded leopard
Tropical rainforests of Southeast Asia host this elusive big cat that sports both the largest canine teeth and the longest tail (relative to body size). Named for their cloud-like spots, they are very vocal and communicate with all manner of purrs, growls, moans and roars.

Lion
Undisputed and undefeated rulers of the African plains, lions are on of the only cat species to live in social groups. Known as a pride, a male lion guards his harem of lionesses that are almost always related. The ladies go out to hunt, and then men stay home and play with the cubs.

Leopard
Often to be found high up in the treetops, leopards are nimble predators who like to eat their kills up high. Their beautiful spotted pelt offers up a perfect camouflage for treetop living, although leopards are also comfortable stalking prey on the ground, or even taking to water to snack on fish as well as crustaceans.

Serval

The cat with the largest ears

SERVAL
Leptailurus serval
Class *mammalia*

Territory Sub-Saharan Africa
Diet Rodents, birds, reptiles
Lifespan Up to 19 years
Adult weight 7-18kgs (15-40lbs)
Conservation Status

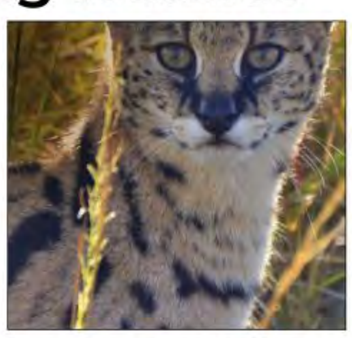
EX EW CR EN VU NT **LC**

LEAST CONCERN

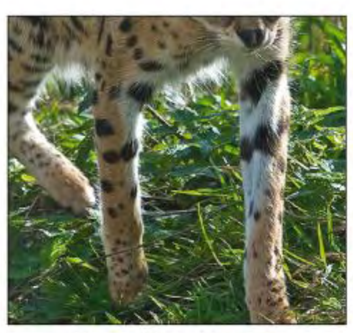
The slightly gangly-looking serval is one of the most endearing-looking wild cats out there. It has the longest legs and largest ears of any cat species, relative to body size. These lanky legs are excellent for leaping, jumping, and reaching into holes to pull out some juicy rodent prey. Similarly, the oversized ears perched atop its head are used for expert hunting – acting as great big satellite dishes sensitive enough to even pick out prey burrowing underground. The serval's long neck sometimes earns these wild felines the nickname 'giraffe cat', it enables them to peek over the tall Savannah grass on the lookout for predators and prey stealers alike, such as leopards and hyenas.

Distinguishing features

Huge ears



Long neck



Lanky legs

BOBCAT
Felis rufus
Class mammalia

Territory North America
Diet Rabbits, squirrels, mice
Lifespan 10-12 years
Adult weight 5-14 kg (11-30lbs)
Conservation Status

EX EW CR EN VU NT LC

NOT EVALUATED

Bobcat

The cat with the greatest range

Found all over the USA, bobcats live in forested or swampy areas. They are stealthy, yet unfussy hunters, and can deliver a deathly blow to their prey of mice, rabbits, squirrels or even things much larger than themselves with a pounce that can cover three metres (ten feet) with the utmost of ease. These cats are so named for their short, 'bobbed' tail, and they have super soft, plushy fur that keeps the cat toasty all year round. Although they usually make their home in wilderness areas, these prolific big kitties have also been known to infiltrate the fringes of towns and cities, taking advantage of the dinnertime spoils served up on a garbage-bin platter.

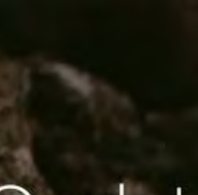
Urban bobcats
Despite a huge habitat, bobcats, like foxes, often infiltrate urban areas

Ocelot

The cat that's both spotted and striped

Ranging from southern Texas to the northern reaches of Argentina, these small and beautiful felines are only about twice the size of a regular housecat. They prefer to slink their way through vegetation, and so are known to live in rainforested, jungly areas where there are plenty of places to both hide and seek. This cat's gorgeous coat features mottled bands and leopard-like spots as well as striking flashes of white around the eyes. These peepers are also incredibly sharp, as ocelots have superb vision – six times better than our feeble humanoid eyes, with a field of vision that's 70 degrees wider; all the better for hunting with.

OCELOT
Leopardus pardalis
Class mammalia

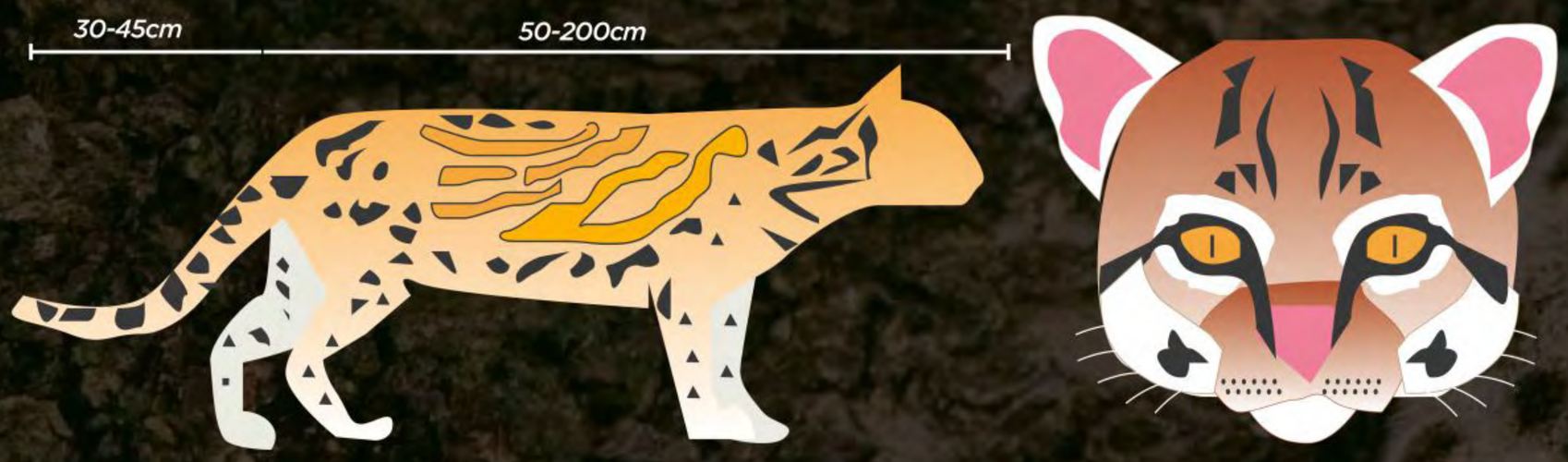


Territory Central and South America
Diet rodents, reptiles, fish
Lifespan 14 years
Adult weight 7-16kg (15-34lbs)
Conservation Status

EX EW CR EN VU NT **LC**

LEAST CONCERN

"Ocelots have superb vision – six times better than our feeble eyes"



Lifespan
While the ocelot can live up to 20 years old in captivity, this spotted felid usually only reaches between seven and ten years of age in the wild.

European wildcat

The cat that looks the most familiar

You would be forgiven for thinking that these cats are just an exceptionally large version of your friendly neighbourhood tabby living in scrubland, forests, marshes and along coasts. Their dark, striped markings, cute-as-a-button faces and extra fluffy tails make them look almost identical to those that lovingly share our sofas. However, underestimating the European wildcat can be disastrous, as these wild moggies are bad to the bone! Although they're known to be the ancestor of our pets, they can be rather vicious and are ice-cold hunters. The biggest threat to European wildcats is interbreeding with domestic cats, and it's not known how many genetically pure populations are remaining. One thing we do know, though, is that this is one kitty that can take care of itself!

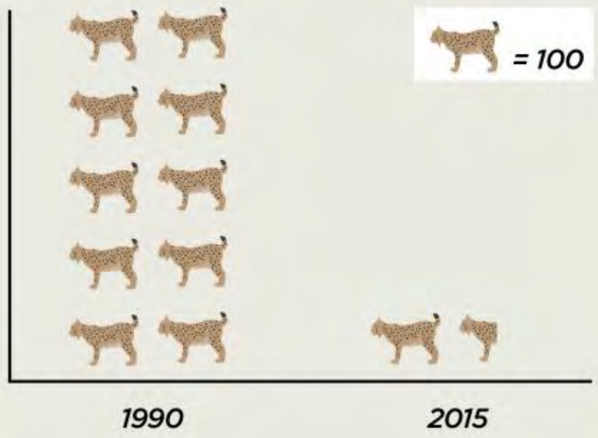
EUROPEAN WILDCAT
Felis silvestris silvestris
Class mammalia

Territory Europe
Diet Rats, squirrels, birds
Lifespan Up to 15 years
Adult weight 2.3-7.2kg (5-16lbs)
Conservation Status

EX EW CR EN VU NT LC
LEAST CONCERN

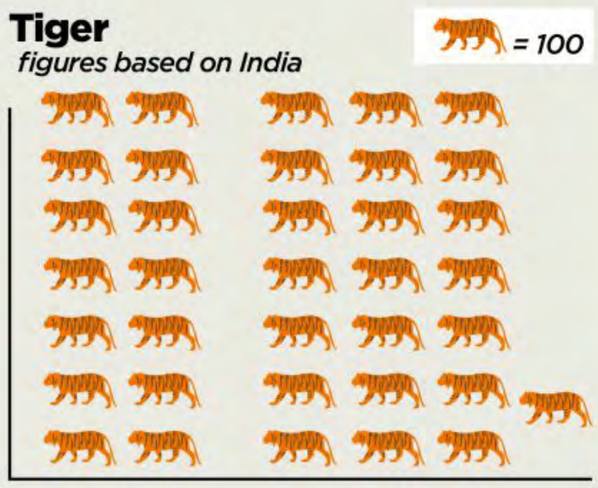
Falling numbers

Iberian lynx

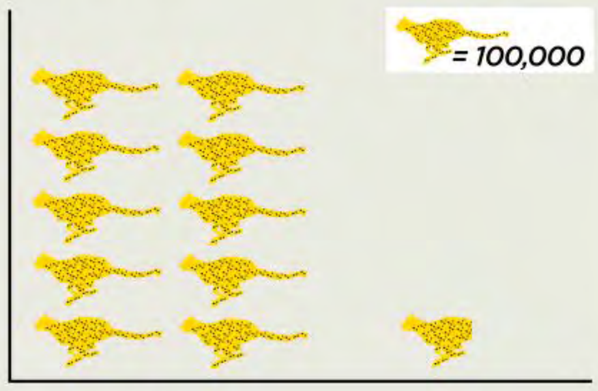


Tiger

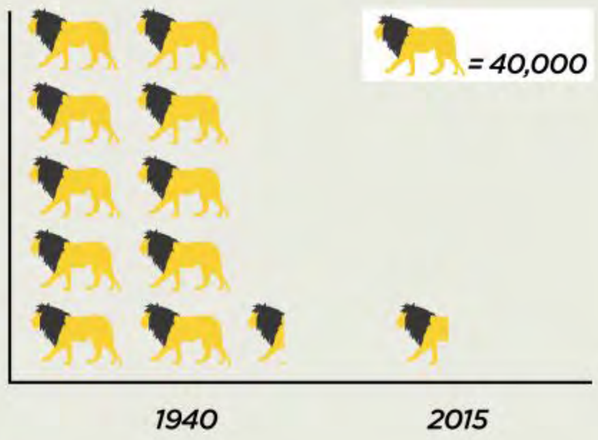
figures based on India



Cheetah



Lion



"Underestimating the European wildcat can be disastrous, as these wild moggles are bad to the bone!"

Caracal

The cat that was once tamed

Caracals are unique wild cats that occupy similar home ranges to cheetahs and were once conditioned by humans to hunt. Caracals have incredibly fast reflexes and powerful, springy back legs – these cats can jump up to three metres in the air and snatch a flying bird out of the sky. Caracals share the same colouring as cougars and lions – they're one of the few wildcat species not to sport markings. Their most distinguishing feature is the jet-black ears topped with tufts that cut a striking silhouette. It's thought that these tufts may be a helpful camouflage in the grass, or may be used to communicate with other caracals.

CARACAL
Caracal caracal
Class mammalia

Territory Africa, Middle East, Asia
Diet Birds, rodents, small antelope
Lifespan Up to 12 years
Adult weight 8-20kg (18-44lbs)
Conservation Status

EX EW CR EN VU NT LC

LEAST CONCERN

Wild cat extremes

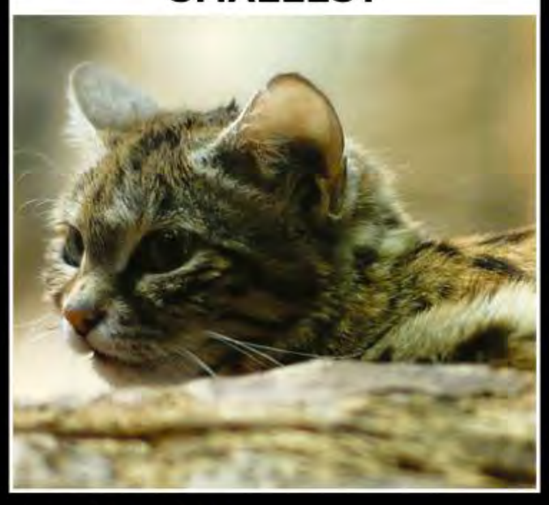
MOST ENDANGERED

South China tiger
In the 1950s, this tiger subspecies was once numerous in its home range. However, the following few decades saw it hunted as a pest, and it is now functionally extinct, with no sightings in the wild for 25 years.

MOST ADADPTED

Canada lynx
This cat is highly suited to its mountainous home, as it sports some thick fur for warmth, tufty ears for hearing prey, super-sharp claws for climbing and incredibly strong hind legs to aid jumping and pouncing.

SMALLEST



Black-footed cat
A tiny little South African wild cat, it measures 35-40 centimetres (14-16 inches) long, and is found in Botswana, South Africa and Namibia in grass plains and scrub desert, and are known to be tenacious and feisty hunters.

MOST ELUSIVE

Scottish wildcat
Britain's very own wildcat species can be found (if you're very, very lucky) roaming the Scottish West Highlands. Looking like a rather beefy housecat, these felines are a dwindling species with only around 35 purebreeds left in the wild.

All about

The African lion

With claws like switchblades, a vice-like jaw and a larynx adapted to produce a fearsome roar, the lion is Africa's most notorious predator

Inside a lion

Lions are specialised killing machines. They have free-floating shoulder blades, switchblade-like claws that can be unsheathed from their paws and huge jaw muscles that allow them to clamp their prey and suffocate it

LION
Panthera leo
Class Mammalia

Territory Sub-Saharan Africa and western India
Diet Carnivore
Lifespan 10-14 years
Adult weight 120-250kg / 265-550lbs
Conservation Status

EX EW CR EN VU NT LC

VULNERABLE

Trachea
A lion's larynx is positioned low in the trachea and can be pulled towards the ribcage, producing a deep roar.

Sight
Lions' eyesight is similar to humans' in daylight, but vastly superior in the dark.

Eye socket

Skull

Canine

Mandible

Carnassial

Teeth and jaw
A lion has huge canines for grabbing prey during a hunt and scissor-like carnassials to slice through meat. The jaw is slightly offset, preventing the teeth from bashing together as it bites.

Claw

Retraction
When the tendons are relaxed, the lion's claws are hidden from view inside the paws.

Protraction
To expose their claws, the tendons above and below each digit are both pulled taut.

Pivot point

Elastic ligament

Lungs

Heart

Forelimb
The underlying bone structure of a lion's forelimb is the same as our own, but adapted to form paws with retractable claws.

INFANCY

Birth *0 months*
Most lion cubs are born blind, weigh around 1-2kg (2.2-4.4lbs) and are covered with spotted fur for camouflage.

Open eyes *2-3 weeks*
The lion cubs open their eyes after approximately two weeks and their milk teeth begin to come through.

JUVENILE

Meeting dad *6 weeks*
When the cubs have become slightly larger and stronger, the lioness will introduce them to the rest of the pride.

Weaning *2-3 months*
Before weaning, lion cubs will suckle from any lactating female in the pride. Two-month-olds begin to share meat after a kill.

Learning to hunt *1 year*
Young lions practice hunting on any moving target, often chasing each other in order to perfect their technique.

MATURITY

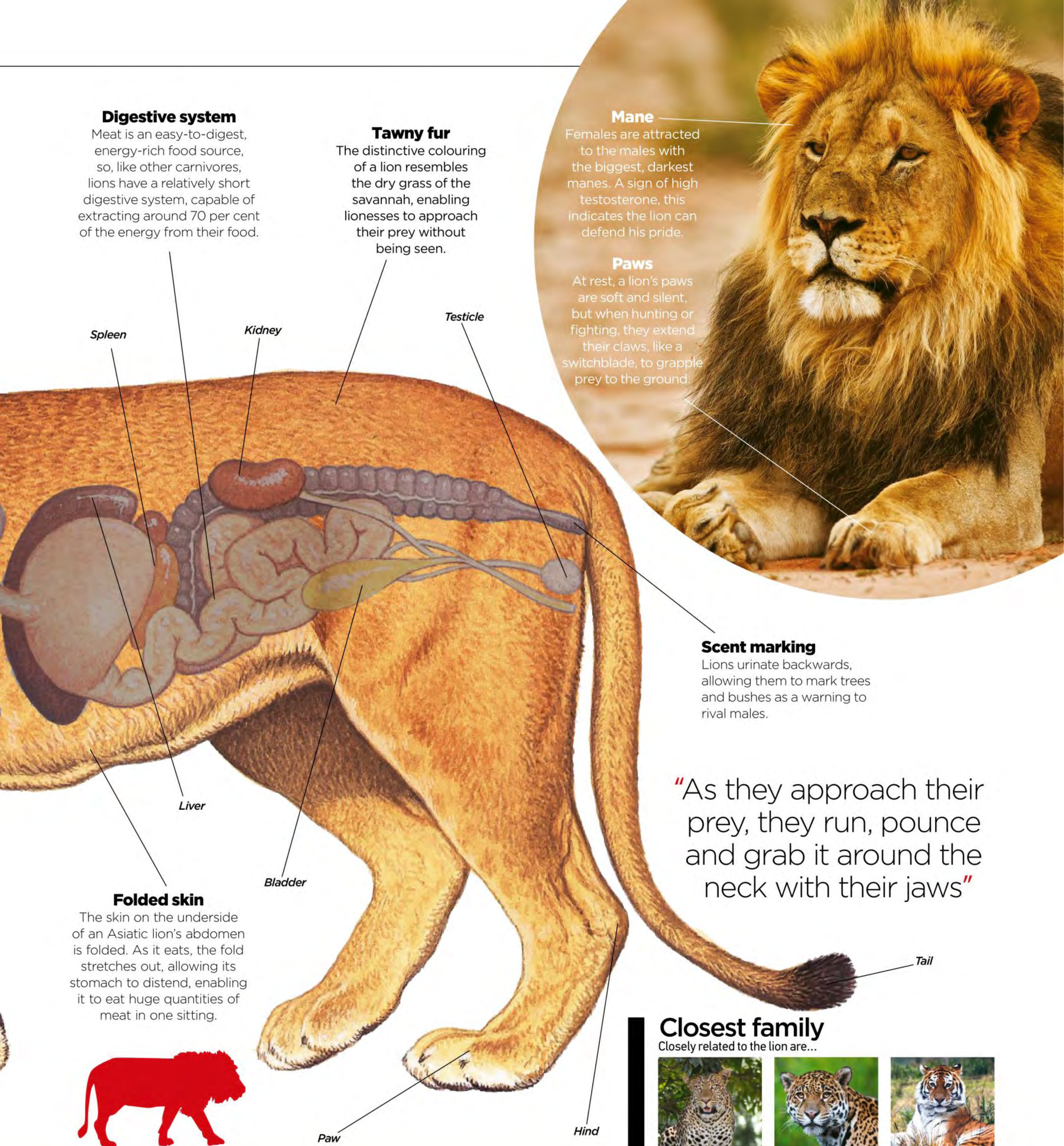
Adulthood *3 years*
Infant mortality is high in lion populations, where only around one in eight cubs reaches adulthood.

Digestive system
Meat is an easy-to-digest, energy-rich food source, so, like other carnivores, lions have a relatively short digestive system, capable of extracting around 70 per cent of the energy from their food.

Tawny fur
The distinctive colouring of a lion resembles the dry grass of the savannah, enabling lionesses to approach their prey without being seen.

Mane
Females are attracted to the males with the biggest, darkest manes. A sign of high testosterone, this indicates the lion can defend his pride.

Paws
At rest, a lion's paws are soft and silent, but when hunting or fighting, they extend their claws, like a switchblade, to grapple prey to the ground.



Scent marking
Lions urinate backwards, allowing them to mark trees and bushes as a warning to rival males.

Folded skin
The skin on the underside of an Asiatic lion's abdomen is folded. As it eats, the fold stretches out, allowing its stomach to distend, enabling it to eat huge quantities of meat in one sitting.

"As they approach their prey, they run, pounce and grab it around the neck with their jaws"

Bachelors *3 years*
When males reach maturity, they are driven from the pride by the dominant lion.

Taking over a pride *3+ years*
Brotherhoods of young males challenge existing dominant lions for the right to their pride and their territory.

Reproduction *4+ years*
Females usually have their first litter of cubs by the age of 4, remaining fertile for the majority of their life

Closest family
Closely related to the lion are...

Leopard
The smallest of the big cats, but what the leopard lacks in size, it makes up in speed and agility. Leopards can reach 58km/h (36mph) and have strong jaw muscles.

Jaguar
The jaguar is the only member of the Panthera genus found in the Americas. Black jaguars as well as black leopards are commonly known as 'black panthers'.

Tiger
The largest cat species, the tiger can be found in territories in Siberia, India and Southeast Asia. Their stripes are like our fingerprints, unique to each individual.

Cub care

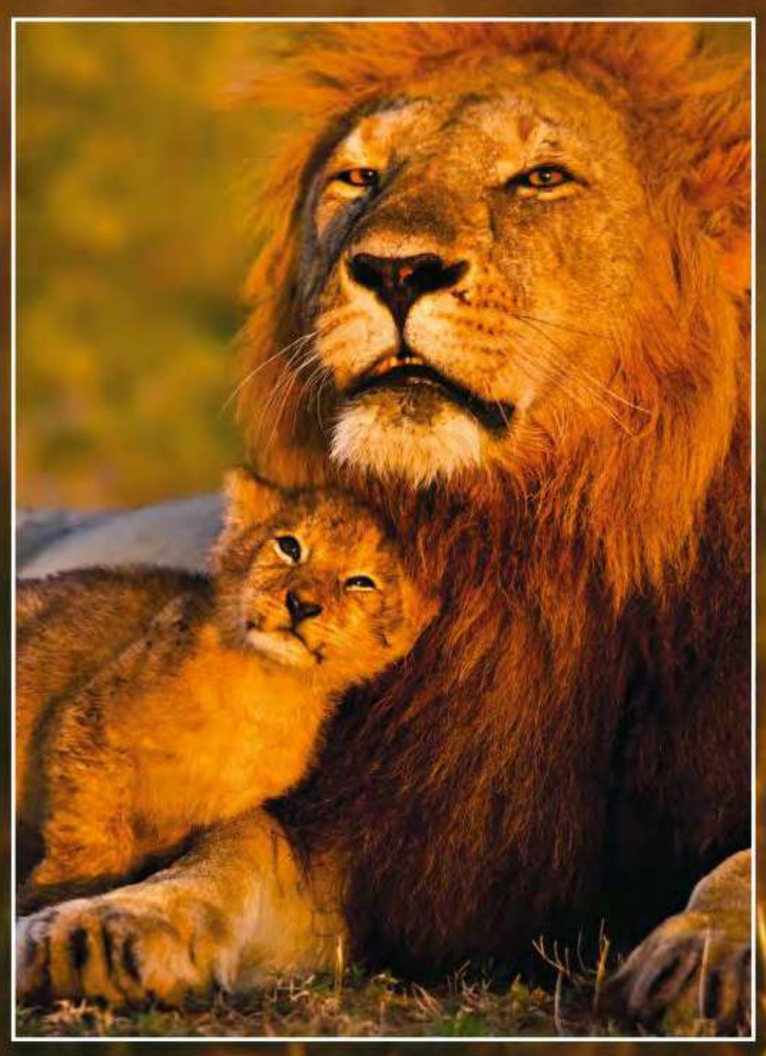
It's hard out there for a young lion

Male lions are unpredictable, rough and sometimes aggressive, so for the first six to eight weeks, a lioness cares for her new cubs on her own. She often chooses to give birth to her vulnerable, blind young under the shelter of a rock, or in thick undergrowth. After about two months, the cubs are ready to meet the rest of the pride. Lionesses share parental duties, and all lactating females in the group will assist with feeding until the infants are weaned. If a mother is killed, her sisters will often take over and raise her orphaned young.

Play is incredibly important in cub development, allowing them to practice the skills required to become competent adult hunters. The cubs watch the females hunt and will attempt to chase anything that moves, from ants to birds and even baboons. They quickly learn which of the local wildlife is worth stalking, so by the time they reach adulthood will rarely waste time attempting to hunt animals that are too large, too dangerous, or too quick to escape. Sometimes the females will bring small prey back for the cubs to practice on, re-releasing it to allow them to hone their hunting skills.

Males are aggressive, but will tolerate their own cubs, even allowing them close enough to feed. Their most important parental role is protecting their offspring from rival males, who will kill any existing young cubs if they succeed in taking over the pride. When the lionesses are hunting, the males stay behind to protect their offspring.

When threatened, females will corral the pride's cubs, picking them up by the scruff of the neck and moving them to safety. By the time they are a year old, they are able to be left alone and at this point will begin attempting to catch their own food in earnest. Initial attempts are often clumsy and unsuccessful, so until they have become competent hunters the pride will share food with the young lions.



"If a mother dies, her sisters often take over and raise her orphaned young"

Mating and reproduction

A lioness's choice of mate can determine the lifespan of her young

When a rival male takes over a pride he will kill all of the pride's cubs so that resources can be diverted to raising his own offspring. Due to this, it is of vital importance to a lioness that she chooses a strong mate, capable of defending her cubs until they are fully grown. Lionesses prefer lions with thick, dark manes – a sign of high testosterone, and an indicator that the lion is strong enough to protect his pride.

Females are in heat several times a year, and cubs are born year-round. When a lioness is fertile, she seeks out male attention, and will mate every 25 minutes for a period of three or four days to maximise the chance of conceiving. Despite the female initiating mating, she can be aggressive, so the male holds her by the scruff of her neck to protect himself. Lion gestation lasts for 110 days, and lionesses give birth alone, in secluded dens, to protect their newborn cubs from danger. Litters vary in size from one to four cubs, or as many as nine in rare cases, but it is unlikely that the whole litter will survive in such instances because a female lion can only feed four cubs at a time.

The fierce competition between male lions means that most are driven from the pride when they reach adulthood. These lions often form small brotherhoods that co-operate to take over a pride of their own. Female lions reach sexual maturity and have their first litter by the age of four. They usually stay within their home pride and by the time they are mature an unrelated dominant lion will be in charge, ensuring genetic diversity.

RIGHT
Lioness mothers do whatever they can to make sure their cubs reach adulthood

The first few weeks of life

Lion cubs are born blind and are unable to walk until they are three weeks old, so they remain in the safety of their den. The lioness cannot leave her cubs for long periods, so she withdraws from the pride, hunting in the local area to maintain her strength so she can produce enough milk. She frequently moves the cubs to a new den to prevent the smell from attracting predators like hyenas and snakes, waiting until the cubs are big enough to fend for themselves before bringing them out into the open to meet the pride.

Born blind
Lion cubs are extremely vulnerable for the first few weeks. They are blind and cannot walk, so they must be kept hidden in a secluded den.

Suckling
A female lion can only feed four cubs at a time. Cubs born into litters larger than this frequently succumb to starvation and die.

Single parent
To protect her cubs, the lioness raises them alone for the first few weeks, keeping them hidden from the pride and other predators.

"She frequently moves the cubs to a new den to prevent the smell from attracting predators"

Camouflage
Lion cubs are born with fur and have dappled spotted markings, helping them hide from predators in the savannah grass.

How the lion hunts A guide to hunting like a true apex predator

1. Stalking the prey
Lionesses hunt in teams. They have limited stamina, so they flank their target, remaining hidden while inching closer.

2. The attack begins
When close enough, they will pounce, joining together to take down an unsuspecting member of the herd.

3. Locked in
They grab the prey around the neck with their immensely strong jaws, preventing it from biting or kicking back.

4. Takedown complete
Their jaw strength will break the prey's spine or crush the trachea in a vice-like grip that can be held for up to ten minutes.

"Female lions are responsible for hunting and raising cubs"

ABOVE Two lionesses nuzzling each other affectionately

Big cat behaviour

Lions are unusual felines and live in large social groups

Cats, domestic and wild, are usually solitary creatures. However, lions inhabit an expansive environment, and their prey travel in large groups, so in order to survive they have evolved a co-operative social system. Lions live in prides consisting of several lionesses, usually sisters, and one or more outsider males. The males defend the territory, while the females work together to hunt and raise the cubs.

They do exhibit many behavioural similarities to domestic cats, including eating grass to help with regurgitation of fur balls, and resting for around 20 hours a day, hiding from the scorching African sun in the shade of rocks and trees. However, lions have evolved their own particular set of behavioural adaptations.

The defining feature of the Panthera genus of big cats is their ability to roar. Lions have a large larynx, with vocal folds similar to those of a domestic cat; as air moves through the folds they vibrate, generating a sound. The difference between lions and cats is that their larynx is much lower in the throat, extending the distance from the voice box to the mouth and nose. Strap muscles attached to the ribcage can be used to pull the larynx further downwards, extending the windpipe like the slide on a trombone, and producing a deeper sound, giving the threatening illusion that the lion is much larger than it is. This sound carries over long distances, warning other males in the area to stay away.

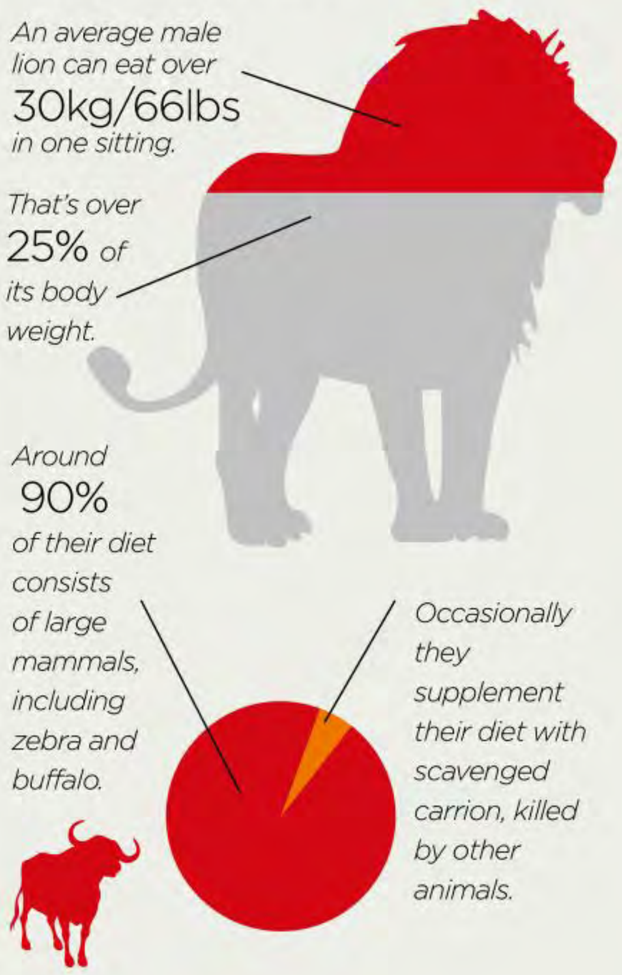
Roaring is not the only way that lions defend their territories; the males in the pride patrol the area every day, spraying a combination of urine and pheromones on bushes, trees and rocks to scent-mark the boundaries of their home and hunting grounds.

Female lions are responsible for hunting and raising cubs. Male lions are hampered by their large manes and stocky stature, while the smaller, lighter, more agile bodies of the lionesses allow them to move silently as they stalk their prey. Lions have relatively small hearts for their body size, and cannot run for long distances, so they use a combination of stealth and teamwork to take down their prey. During hunting, groups of females flank their prey, working together to surround their target. They slowly inch closer, walking on the soft pads at the bottom of their paws to avoid alerting their target.

The social interactions between members of a lion pride help to ensure that the individuals function as a team. Lions use peaceful and affectionate rubbing and licking to bond with one another and will call for lost members of the group, ensuring the pride remains together.

Diet and feeding

The lion is an apex predator, at the very top of the food chain.



Life in the lion pride

Lions live in co-operative social groups, working together to hunt, fight, survive and raise their young

After a hunt or a fight, females will keep their distance from males to avoid conflict.

Father and cubs

Male lions are tolerant of their young cubs, allowing them to steal small mouthfuls of food. However, as they mature the males become increasingly aggressive, eventually driving any upcoming males out of the pride.

Feline sisterhood

Each pride has several lionesses, usually sisters, who work together to hunt and raise their cubs. The males are almost always unrelated outsiders who have fought with other males to take over the territory.

Passing the time

Lions spend the majority of the day resting in the shade, avoiding the intense African sun. Young cubs remain close to the lionesses. Older cubs are often left unattended, spending their time honing hunting techniques and playing.

Lionesses are constantly on the lookout for danger lurking in the undergrowth.

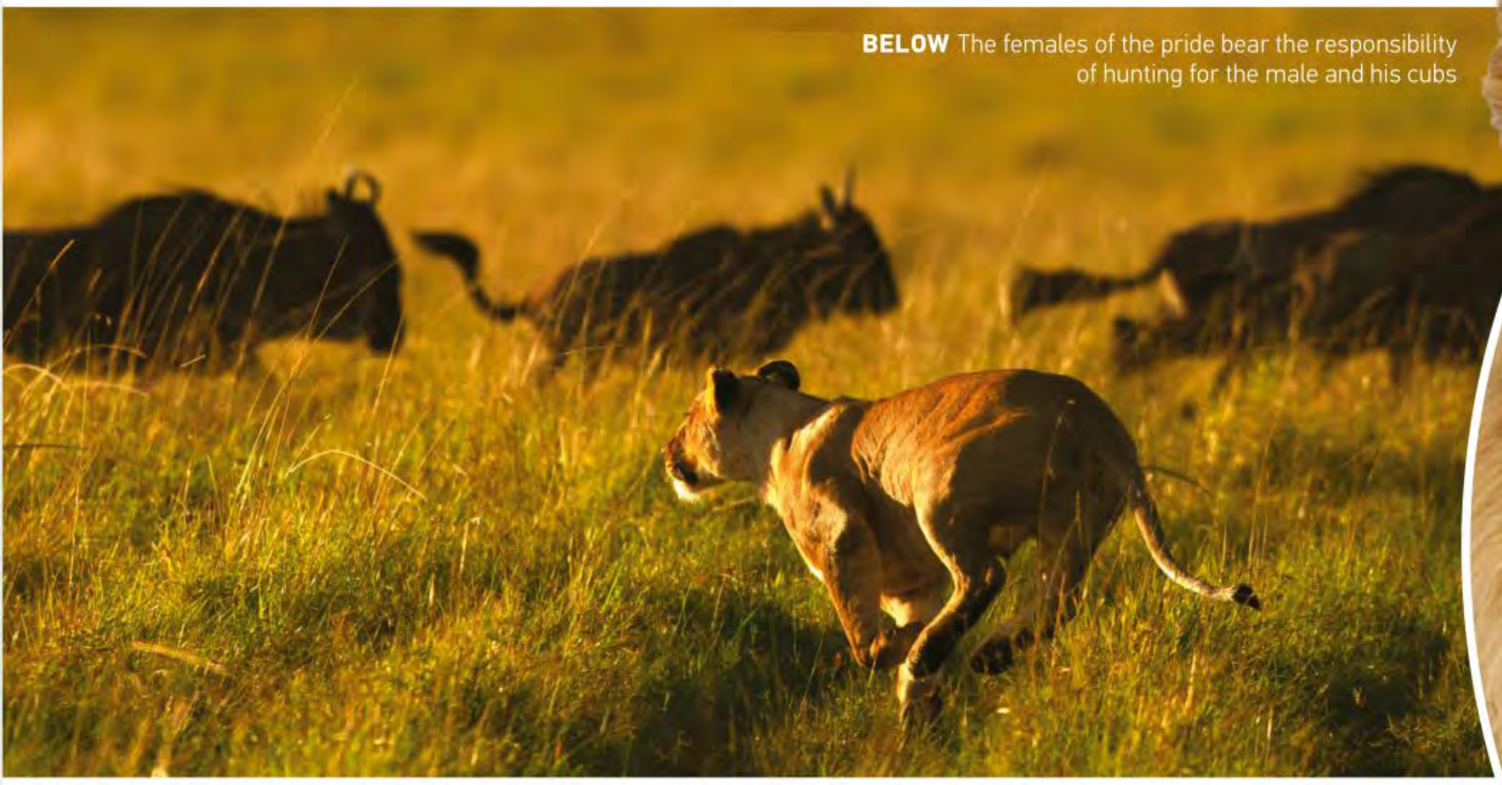
Cubs spend much of their time playing, but are more careful around the volatile adult males.

Raising cubs

At about 6 weeks old, cubs are introduced to the pride and begin learning the skills required to hunt.

Ruling the pride

The dominant male often has the darkest mane. He provides protection, patrolling their territory and using a combination of roaring and scent-marking to maintain the perimeter.



BELOW The females of the pride bear the responsibility of hunting for the male and his cubs

The roar of a lion can be heard from an incredible distance of 8km (5mi)

Ruling the savannah

Safe lion-habitats are shrinking due to farming, hunting and poaching

The vast majority of the remaining lion population is found in eastern and southern Africa, but numbers are estimated to have dropped from as much as 400,000 in 1950 to between 16,500 and 47,000 today. Numbers in Asia are smaller still, with Asiatic lions driven close to extinction.

In other regions, farming, hunting and poaching have driven populations away. Steady conversion of their habitat into farmland reduces available grazing for prey animals, forcing lions to attack domestic livestock. This results in retaliation by farmers, and is having a significant impact on population numbers. Living in close proximity to humans, and our animals, has also introduced disease into the lion populations, including distemper (from domestic dogs), and tuberculosis (from cattle and buffalo).

Lion habitat varies from grassy plains to forests and thick brush. The most successful lion prides live around river confluences, where water is plentiful. An abundance of water attracts prey animals providing a year-round food supply. Acacia trees provide shade, and the lion's tawny fur enables them to hide in the dry savannah grass.

The territory of one pride can range from 20-200 square kilometres (52-520 square miles), and a pride may move up to 9.5 kilometres (six miles) each day. This vast range is difficult to defend alone, and led to the development of the unique social structure of these big cats. There are over 1,000 African lions and nearly 100 of their Asiatic cousings in zoos across the globe. Breeding programs are underway to preserve threatened lion subspecies, and reintroduce them into the wild.

Sharing parenting duties
Groups of females work together to protect cubs from danger in their environment.

Conserving energy
Lions rest for up to 20 hours a day to avoid overheating in the sun.

Environmental threats

The biggest environmental threat to the lion populations is humanity

Poaching
Africa supplies lion bones to Laos, Vietnam and China, where they are ground into a paste and used in traditional herbal medicine, along with the bones of other big cats.

Crops
As the agricultural industry develops in Africa, lion territory is being fragmented and destroyed as it is turned over to become farmland for growing crops.

Cattle
Prey animals eaten by the lion are herbivores, and they compete for space with farm animals. Where there is competition for land, cattle farmers poison, trap or shoot lions.

Inbreeding
Fragmentation of lion populations due to habitat erosion leads to isolation. Small populations gradually become inbred, threatening future generations.

"The most successful lion prides live around river confluences, where water is plentiful"

Nearest neighbours

Lions may be a top predator, but they share their home with dangerous creatures

Spitting cobra
Several species of cobra in Africa are able to spit venom from holes in the tips of their fangs. If the venom gets into the eyes of a lion it can cause permanent blindness, an injury that can prove fatal in the long run.

African honeybee
African honeybees are more aggressive than their European counterparts, and threatened hives will swarm more readily, sending out drones and chasing their targets, including lions, for great distances.

Baboon
Baboons are ground-dwelling primates and are sometimes hunted by lions. But the lions are poor climbers, so once the baboons reach the trees they are usually safe and will throw sticks and foliage at their grounded attackers.

African elephant
Lions share their home with the largest land-dwelling animal, the African elephant. These herbivorous giants are much too large to be threatened by the cats and will trample cubs if they get in the way.

Lions and humans

Big cats have been kept as pets, exhibits and curiosities for centuries. The ancient Egyptian temple at Taremu housed live lions as a tribute to Maahes, the lion prince, and the animals were even kept at the Tower of London. They have been hugely popular in zoos since the 18th century, and there are over 1,000 lions currently in captivity around the world in various wildlife establishments.

Historically, humans have treated the fearsome predators very poorly, keeping them captive in cramped conditions and using them for brutal entertainment. Lion-baiting pitted the cats against other carnivores in combat – a practice that, shockingly, continued in England until as late as 1825. Circuses also frequently used lions as part of their act, and some still do to this day. Captive lions in modern zoos are much better cared for, and many are often involved in breeding programs that are designed to protect threatened subspecies.

Lions do not usually hunt humans, but there have been some recorded instances of man-eating by the big cats in history. In Tanzania, it is estimated that lions kill up to 70 people a year. It is thought that sick or injured animals prey on humans because we pose less of a challenge than their usual prey.

In our culture

The lion is an iconic animal figure in human culture

The Lion King
Disney's 1994 film *The Lion King* is loosely based on Shakespeare's *Hamlet*, and tells of a conflict between Simba and his uncle Scar, as they fight for dominance over Pride Rock.

Aslan
In C S Lewis' *The Chronicles of Narnia*, Aslan is the powerful King of Beasts and acts as a mentor and guide to the children after they step through their famously magical wardrobe.

Elsa
The 1966 film *Born Free* (based on the book of the same name) follows Elsa, an orphaned lion cub, as she is raised by humans and released into the Kenyan wilderness.

—ASIATIC LION—

COMEBACK KING

In one of the greatest conservation success stories of our time, the Asiatic lion (*Panthera leo persica*) has clawed its way back from the brink of extinction. Find out how these proud predators were given a second chance with the extraordinary support of local people

Big Cats

ASIATIC LION
Panthera leo persica
Class Mammalia

Territory Gir Forest, Gujarat, western India
Diet Large mammals including goats and buffaloes
Lifespan 15-20 years
Adult weight 136-226.8kg (300-500lb)
Conservation status

EX EW CR **EN** VU NT LC

ENDANGERED

Having once inhabited a range that stretched from eastern Europe to west, central and south Asia, Asiatic lions can now only be found within the Gir National Park and Wildlife Sanctuary. Their numbers plummeted to near-extinction levels at the turn of the 20th century, but in 2005 they became the first carnivorous species to be downgraded from Critically Endangered to Endangered by the International Union for Conservation of Nature (IUCN). Thanks to the conservation efforts of the Gujarat government and the unfailing support of the local people, these wild cats established a record-high population of around 650 individuals within the Gir National Park and Wildlife Sanctuary this summer.

Asiatic lions diverged from their African counterparts between 100,000 and 200,000 years ago and exhibit subtle physical differences when compared to African lions. They are typically smaller in size, with a maximum recorded body length of 2.9 metres (9.5 feet) from head to tail. Male Asiatic lions also sport a smaller mane than African lions, making their ears more visible, while their coats are thicker and they have a longer tail tassel. Perhaps the most obvious physical distinction between the two subspecies is a skinfold that can be seen on the abdomen of the Asiatic lion but is absent on African lions.

Despite their physical similarities, cross-breeding of Asiatic and African lions in the 1970s in India resulted in tragedy as deformed hybrids with compromised immune systems were born. Kuldip Kumar, the director of the Chhatbir Zoo, says, "The hybridisation between the Asiatic

> "Asiatic lions diverged from their African counterparts between 100,000 and 200,000 years ago"

Asiatic lions exist in matriarchal prides, with males competing to defend their territory and lionesses

The history of the Asiatic lion

Since their divergence from their African counterparts, Asiatic lions have clung on through much adversity

PREDATOR BECOMES PREY

1800s
The Asiatic lion population falls victim to hunting from British imperialists and Indian maharajas, pushing the species to the verge of extinction.

A NEED FOR CHANGE

1890
The Nawab of Junagadh recognises the need for change when he is unable to find a lion for the Duke of Clarence to shoot. As few as 12 Asiatic lions remain.

THE GIR NATIONAL RESERVE

1900
The Nawab of Junagadh declares the Gir a protected area for the lions and the Gir National Reserve is created. The Nawab's son later plays a key role in working to save the imperilled lions.

Asiatic lion

and African lions in zoos, and their subsequent inbreeding since the mid-1980s, has weakened the bloodline and devastated their gene pool."

In an effort to preserve the Asiatic lion bloodline, all captive hybrids were left to die before being replaced by 'true' Asiatic lions sourced from the Gir reserve. This fate came prematurely for many as a result of the genetic defects caused by hybridisation.

Extensive hunting by British imperialists and Indian maharajas at the turn of the 20th century was one of the key factors that brought Asiatic lions to the brink of extinction. In 1890, the Nawab of Junagadh, Saheb Sir Muhammad Rasul Khanji II, who ruled over the princely Junagadh State, discovered the desperate reality of the Asiatic lion population when he struggled to find a specimen for the Duke of Clarence to shoot. Realising the fate of the Asiatic lion was in his hands, he declared the Gir to be a protected area for this endangered species. Unfortunately, the plight of the lions continued to worsen.

Afflicted by famine from 1901 to 1905, the lions were forced into local farmlands and human settlements in search of food, where they killed both cattle and villagers. Yet despite the many human casualties, the Nawab of Junagadh maintained his protection for the animals and slowly their numbers increased up until his death in 1911. At this time, around 12 to 13 lions were still being shot per year. However, as the Gujarat government took control of hunting in the area, shooting of these endangered mammals was banned.

For any conservation attempt to be successful, the needs of the threatened animal must be balanced with the needs of the local community; such projects hinge on the continued support of the local people. The success of the Gir National Park and Wildlife Sanctuary in ensuring this is demonstrated by the total lack of retaliatory killings of lions by residents in the Gir despite loss of cattle and human life. This attitude is greatly reflected in a saying the local people live by: 'Saavaj che to ame chye, ame chye to saavaj che', which translates as 'We thrive since the lion thrives, and vice versa'. A combination of cultural pride and an understanding of the economic benefits of keeping the Asiatic lion population alive has turned the local

INCREASE IN NUMBERS

1936
In 1936 the first official Asiatic lion census was conducted and found there were 150 individuals inhabiting the Gir Forest. This upward trend continued, with a census taken every five years.

DOWNGRADING OF IUCN STATUS

2005
In 2005 the Asiatic lion is officially downgraded from Critically Endangered to Endangered by the IUCN. It is the first carnivore to be downgraded.

HOPE FOR THE FUTURE

2017
As the population of Asiatic lions continues to climb, ZSL and the Gujarat government are working together to expand the range of the Gir National Park and Wildlife Sanctuary.

Asiatic lions were once hunted to the brink of extinction, but killing these beautiful animals is now illegal

The Gir National Park and Wildlife Sanctuary

The protected area that is home to the entire Asiatic lion population

BELOW While young females will typically remain with their family, males may leave to form another pride

communities — the lion's greatest competitor for resources — into one of the most effective and integral tools of the entire conservation effort.

"Asiatic lions are known in India as 'the pride of Gujarat'," says Gitanjali Bhattacharya, conservation programmes manager for central and south Asia from the Zoological Society of London, "and this passion for them ensures that, unlike many other big predators elsewhere, they currently face relatively minimal threat from hunting or poaching."

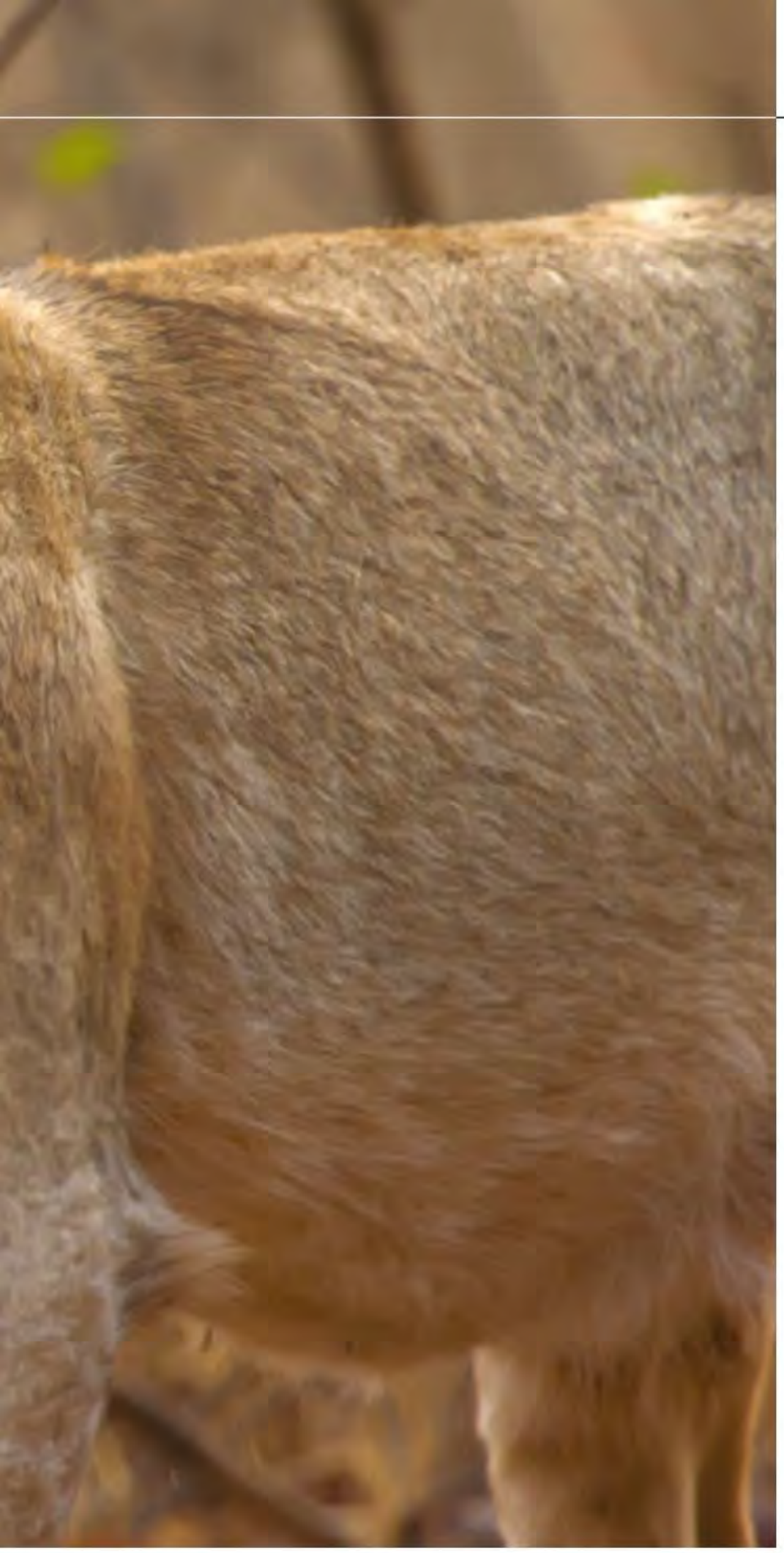
The lions' future depends on this special understanding between man and beast.

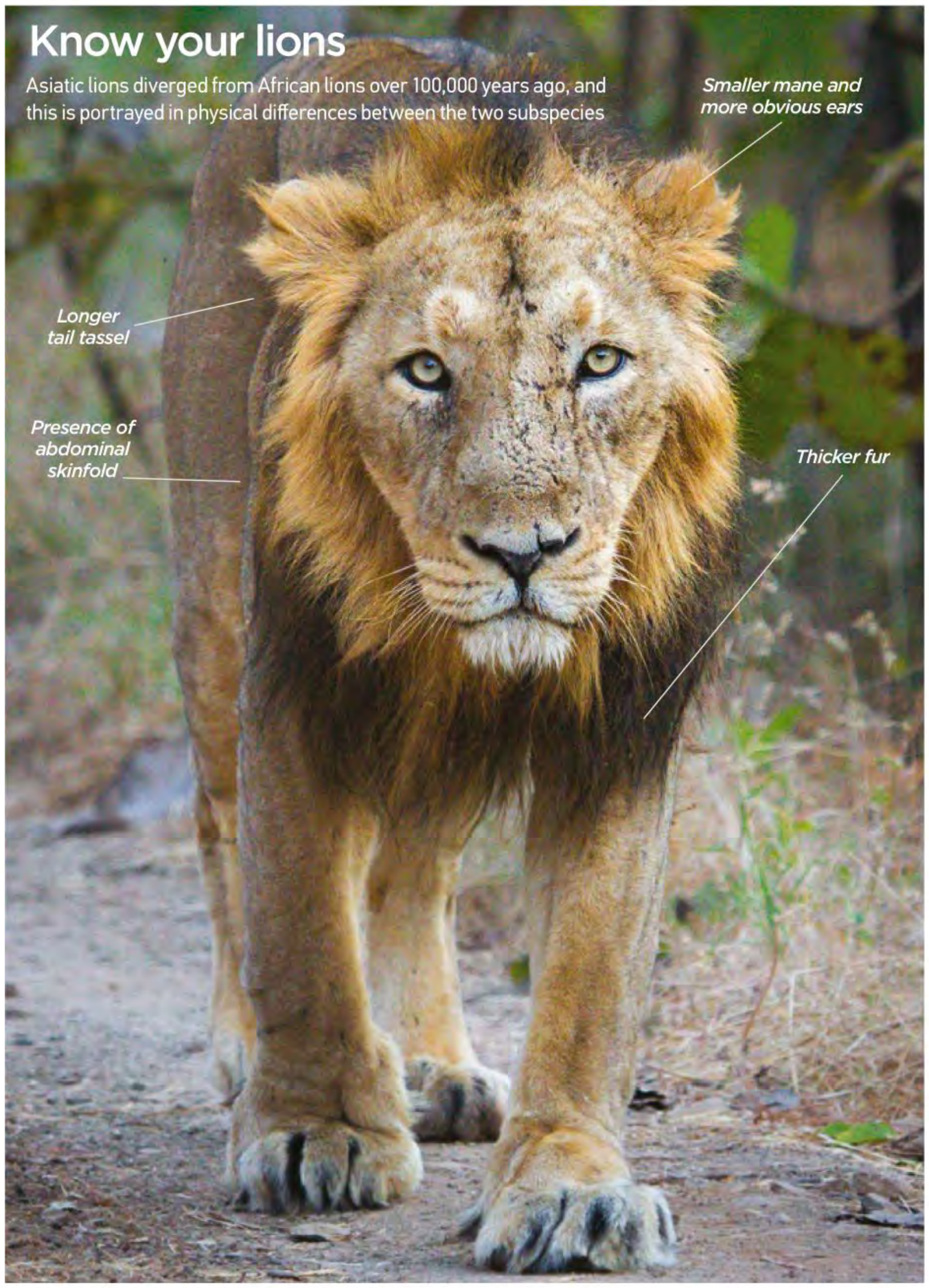
The Forest Department rewards the kind nature of the locals with a highly efficient conservation management strategy that seeks to protect their communities and, when necessary, ensure fair and swift compensation for those negatively impacted by the lions. Loss of cattle or human life is redressed with financial compensation within 24 hours of the event, hoping to mitigate the loss suffered.

The presence of the forest officials within the Gir is extensive, with hourly patrols and separate teams monitoring the entire reach of the reserve. Each day, a Lion Sighting Report is sent out to monitor for the loss of individuals in the pride and behaviour that could indicate a lion, or lions, are moving uncommonly close to neighbouring villages. A system of Van Prani Mitra (friends of the forest animals) has also been put in place, which entails each village appointing a wildlife watcher for the Forest Department.

These watchers monitor the movement of wildlife to reduce the risk of fatal interactions between humans and lions. Remarkably, the field staff is made up of many all-women teams, which is a first for India and a source of great pride for those involved.

Thanks to the numerous and high-quality wildlife treatment centres within the Gir, veterinarians can respond swiftly to reports of injured lions. As a result, each year approximately 40 of the rescued lions brought in for treatment are able to be released back into the wild. The Zoological Society of London (ZSL), in association with the Wildlife Institute of India and Gujarat Forest Department, is working to safeguard Asiatic lions as their





ABOVE With the help of the Gujarat government Asiatic lions have recovered from as few as a dozen individuals to a population of over 600

population continues to remain vulnerable. Bhattacharya explains, "As the Asiatic lion's population grows their range is gradually expanding, and they are at increased risk of coming into contact with human communities that are less accustomed to their presence and may be less comfortable with lions living on their doorstep.

"To help mitigate this issue, ZSL has supported the government of Gujarat in drafting an updated strategic plan for Sakkarbaug Zoo in Junagadh, designed to increase their engagement and education efforts with local communities. Hopefully this approach will help to ensure that local communities continue to welcome the lions' presence as they expand their range, rather than begin perceiving them as a threat.

"Thanks to the work of the government of Gujarat and the local community, support numbers have now steadily risen to around 500. The species is no longer absolutely on the brink, but it still requires dedicated support to ensure this progress continues in the face of more recent challenges like population growth and habitat loss."

Thankfully, the current situation for Asiatic lions is optimistic — their range, which is currently similar in size to Greater London, continues to expand. However, due to their confined location and small population size there is still the risk of a catastrophic decline in the number of individuals due to a natural disaster or disease outbreak.

To counter this threat a plan is in place to translocate some of the lions from the Gir to the Kuno Palpur Wildlife Sanctuary south of New Delhi. Provided that IUCN studies find the lions' potential new home to be of adequate size, the Asiatic lion may once again roam beyond the Gir, a possibility hailed by Bhattacharya.

"Not only has the lions' future been secured, but we're now entering a second phase where the lion is beginning to regain some of its old territories. It's one of the greatest conservation success stories."

"The situation for Asiatic lions is optimistic — their range, similar in size to Greater London, continues to expand"

Head to head
Lion Vs Tiger

Battle of the big cats: discover which one reigns supreme

Strength 7/10
While extremely strong, a single lion could only take down a small zebra without help from the pride.

Aggression 9/10
When rivals meet, they can fight to the death. Competition is fierce, so males are in constant pursuit of power.

Size 7/10
Lions weigh up to 250 kilograms (550 pounds). Living in prides allows them to be smaller than other big cats.

Speed 8/10
A lion's top speed is 80 kilometres (50 miles) per hour in short bursts, racing after fast-moving prey.

Brains 6/10
A lion's brain weighs 240 grams (0.5 pounds), and contributes 0.1 per cent to the cat's total body weight.

Bite force 7/10
46 kilograms per square centimetre/650 pounds per square inch.

Teeth
The fangs of the largest lions can be 12 centimetres (five inches) long. They tear prey to shreds with sharp molars called carnassials.

Socialising
Male groups protect the pack, especially to keep newborns safe. Females share the care of cubs – older females even baby-sit their grandchildren.

Camouflage
A tiger's stripes help break up its outline, making it more difficult for prey to detect. It helps tigers slink between trees, trailing unsuspecting prey.

Roar
A tiger's roar can carry over two kilometres (1.2 miles), and is used to communicate with other tigers rather than to scare prey.

Strength 10/10
Solitary tigers can kill animals that outweigh them by up to five times, like the enormous 1,000kg Indian bison.

Aggression 7/10
If two tigers cross paths, there is usually very little aggression in most cases. These big cats simply let others pass.

Size 8/10
Reaching incredible weights of up to 390 kilograms (860 pounds), tigers are the biggest cats on earth.

Speed 6/10
Only able to run for short bursts of time, a tiger's maximum speed is 65 kilometres (40 miles) per hour.

Brains 7/10
A tiger's brain makes up 0.06 per cent of its massive body weight, weighing in at 265 grams (0.6 pounds).

Bite force 9/10
74 kilograms per square centimetre/1,050 pounds per square inch.

Would they ever meet?

Although they are closely related, lions live in Africa while tigers live in Asia. These big cats would never naturally meet as they are separated by thousands of miles.

Tiger territory
Lion territory

Endangered Siberian tiger

SIBERIAN TIGER
Panthera tigris altaica
Class Mammalia

Territory Russia, China
Diet Deer, wild boar, bears, elk, rabbits, hares
Lifespan 20-35 years
Adult weight 300kg / 660lbs
Conservation status

EX EW CR EN VU NT LC

ENDANGERED

Once one of the most numerous tiger on the planet, the magnificent Siberian tiger has been hunted by humans to the brink of extinction, reduced to less than 40 individuals at one point. Now, with protection in law, the population has recovered to over 500, but this is still under severe threat

"Poaching continues unabated in Russia and China, causing 80 per cent of Siberian tiger deaths yearly"

Threats to the species

Poaching

Despite being outlawed, poaching continues unabated in large parts of Russia and China, causing 80 per cent of known Siberian tiger deaths each year. The poachers keep hunting in order to sell the animal's skin and organs, which both fetch high prices on the exotic animal black market.

Habitat loss

Consistent logging – both legal and illegal – as well as unbridled human development and domestic animal grazing, has seen the Siberian tiger's natural habitat segmented and destroyed. This has led to increased isolation of the species, with the reclusive animal driven further and further into what little wilderness remains.

Prey depletion

One of the biggest causes of tiger population decline is the rapid depletion of its prey base, with humans both legally and illegally hunting its natural food sources. The two biggest losses are deer and wild boar, however everything from rabbit and hare to fish and elk are being consistently removed at unsustainable rates.

What you can do

WWW.ALTACONSERVATION.ORG

There are numerous charities currently working to safeguard the Siberian tiger and its natural habitat. The Amur Tiger and Leopard Conservation is one of the most notable, with its website listing lots of information about the species and ways to get involved in conservation efforts.

Decreasing numbers

Once prolific across the far east of Russia, Siberian tiger numbers are now measly

Russia

Estimated number of Siberian tigers left in this country today:

562

China

Estimated number of SIberian tigers left in this country today:

27

1850

Estimated total animal population in the mid-19th century:

1,000

The decreasing habitat

Historically the Siberian tiger could be found throughout the entire Russian far east, the Korean peninsula and large swathes of north-east China, with perhaps more than 1,000 individuals maintaining a healthy population. Today this traditional range has been reduced to just small fragmented groups in the Russian Sikhote-Alin mountain range and miniscule pockets of China. Rumour has it that some tigers may now exist in Korea, however this has never been independently verified.

Territory in 1800

Territory in 2014

Jo Cook, Amur Leopard and Tiger Alliance

The co-ordinator for this vital conservation organisation explains how you can get involved in protecting these vulnerable big cats

Could you explain your role at ALTA?

I am the ALTA co-ordinator, so I'm responsible for generating funds from members of the public, businesses and zoos to send to our projects in the Russian far east and China.

I liaise with our implementing agencies, which are Phoenix Fund, Zoological Society of London (ZSL), Wildlife Conservation Society (WCS) and Wildlife Vets International (WVI), ensuring that they submit appropriate project proposals to us and that the projects we fund are making a real difference to Amur tiger and leopard conservation.

I also keep our Facebook, Twitter pages and our website up-to-date so people know what's happening. Essentially I do everything that needs to be done to keep ALTA running!

Could you provide an example of an Amur tiger conservation project ALTA is currently involved with?

Many of the projects ALTA funds involve an element of anti-poaching work. This includes training in specialist software... and collecting data from anti-poaching patrols. [This data could include] distances covered by foot, 4x4 and snowmobile, where the patrol was conducted and if any violations were uncovered. [Other data collected would include the number of] poachers apprehended, activity spotted, snares collected and so on.

This information can then help determine how future patrols should be carried out, which areas should be targeted and at what times. Since these mechanisms have been in place, more poaching violations have been recorded and more poachers have been caught. The anti-poaching work can also be more low-key, by providing appropriate clothing for the guards, fuel and spare parts for the vehicles, or simply employing more people to carry out the patrols.

How can our readers best get involved in protecting Amur tigers?

The best way to get involved in Amur tiger conservation is to raise awareness of their situation and inspire others to help. If possible, raise funds for projects protecting them in the wild and donate them to an organisation such as ALTA (information can be found on our website on how to donate). Also, never purchase something that may be derived from tigers, such as traditional Chinese medicine, tiger bone wine and tiger-skin rugs.

For more on ALTA's activities and ways you can donate, please visit the organisation's website at: **www.altaconservation.org**

All About Leopards

Solitary and reclusive, these adaptable cats are some of nature's most agile climbers and are right at home in the trees

Inside a leopard

Leopards might be the smallest of the big cats, but they're some of the most adaptable. With short legs, large paws and long tails, they are agile climbers and able to tackle prey several times their own body weight

LEOPARD
Panthera pardus
Class Mammalia

Territory Africa and Asia
Diet Carnivore
Lifespan 12-15 years
Adult weight 60kg / 130lbs
Conservation status

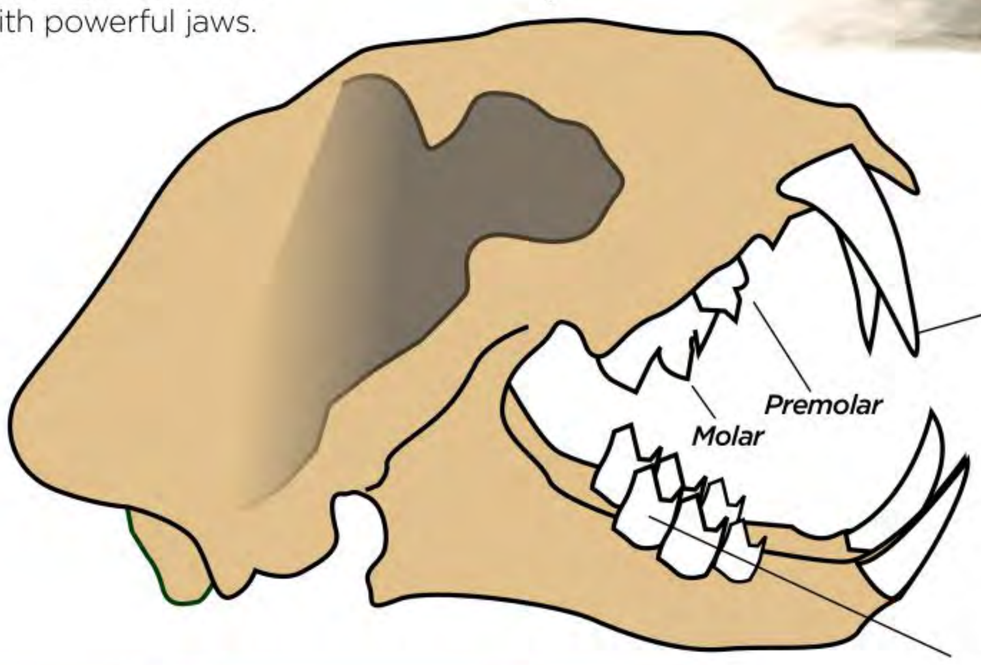
EX EW CR EN VU NT LC

NEAR THREATENED

Night vision
Leopards are nocturnal, so their eyes have a reflective membrane called the tapetum lucidum to maximise the amount of light captured by the eye.

Strong shoulders
With well-developed muscles in their shoulders and forelimbs, adults can drag large carcasses over six metres (20 feet) into the trees.

Large skull
Their skulls are broad, and they can tackle animals up to ten times their own body weight, snapping their necks with powerful jaws.



Canine
Four thick, strong canines enable the leopard to grip its prey firmly.

Carnassial
These teeth are sharp and bladed – ideal for slicing through meat when eating.

Black panther
The colour of a leopard's coat varies according to its environment, with darker colours seen more frequently on mountain- or forest-dwelling cats. Occasionally a leopard will inherit two faulty copies of the gene coding for coat colour and they are born with almost completely black fur.

Heart

Big paws
In comparison with their body size, leopards have very large paws, providing the additional grip required for life in the trees.

INFANCY

Newborn cub *1 day*
Leopard cubs are born totally blind and often weigh less than a bag of sugar.

Staying hidden *0-2 weeks*
The mother moves the cubs frequently, changing the den site every few days in order to elude predators.

Starting to explore *2 weeks*
After about a week the cubs begin to open their eyes and by two weeks of age they are able to walk around.

JUVENILE

Leaving the den *6-8 weeks*
By the time they are two months old, the cubs are ready to leave the den to begin practising their hunting and climbing skills.

Eating meat *3 months*
The female leopard will continually bring food back to the den, sharing up to a third with her hungry cubs.

Hunting independently *20 months*
The cubs practise hunting small prey like insects and reptiles, and by the time they're 20 months old they are no longer reliant on their mother for food.

Long, flexible spine
An elongated frame enables leopards to stretch and recoil like a spring, leaping forward several metres at a time.

Eye protection
Just like the black paint worn by American football players, the black colouring around the eyes of a leopard reduces the harsh glare from the Sun.

Kidney

Stomach

Short digestive system
Like other carnivores, leopards have a short, efficient digestive system.

Counter-shading
Leopards are white on the underside and tawny brown on top, counteracting natural shadows cast by the Sun and helping to keep them hidden from view.

Rosettes
The markings of a leopard are characteristic of a species that lives in the shade of the trees. Their fur is covered in a distinctive pattern of round or square rosettes, breaking up their outline in the dappled shade.

MATURITY

Establishing a territory *2 years*
Competition for food is fierce, so adult leopards use a combination of scent-marking, vocalisations and fighting to defend their hunting grounds.

Finding a mate *2 years*
Female leopards seek out the attention of males, signalling their fertility with scent markers in their urine.

Raising young *3 -12 years*
Male leopards play no role in raising their cubs, so the female works alone to feed and protect them until they grow bigger.

Closest family
Closely related to the leopard are...

Snow leopard
Snow leopards are adapted to a cold environment, with stocky bodies, thick fur, and wide paws suited to walking on snow. Despite similarities in appearance, they're more closely related to tigers than leopards.

Tiger
Tigers are the largest of the big cats and share many similarities with leopards. They live a solitary lifestyle, preferring to ambush, rather than chase their prey. They are strong swimmers, spending lots of time in the water.

Jaguar
Jaguars are often confused with leopards, but their markings are quite different. Leopards have distinctive, small, rosette-shaped spots. Jaguars also have rosettes, but they're larger and thicker.

Ambush antics

The hunting strategies of a cat born to climb

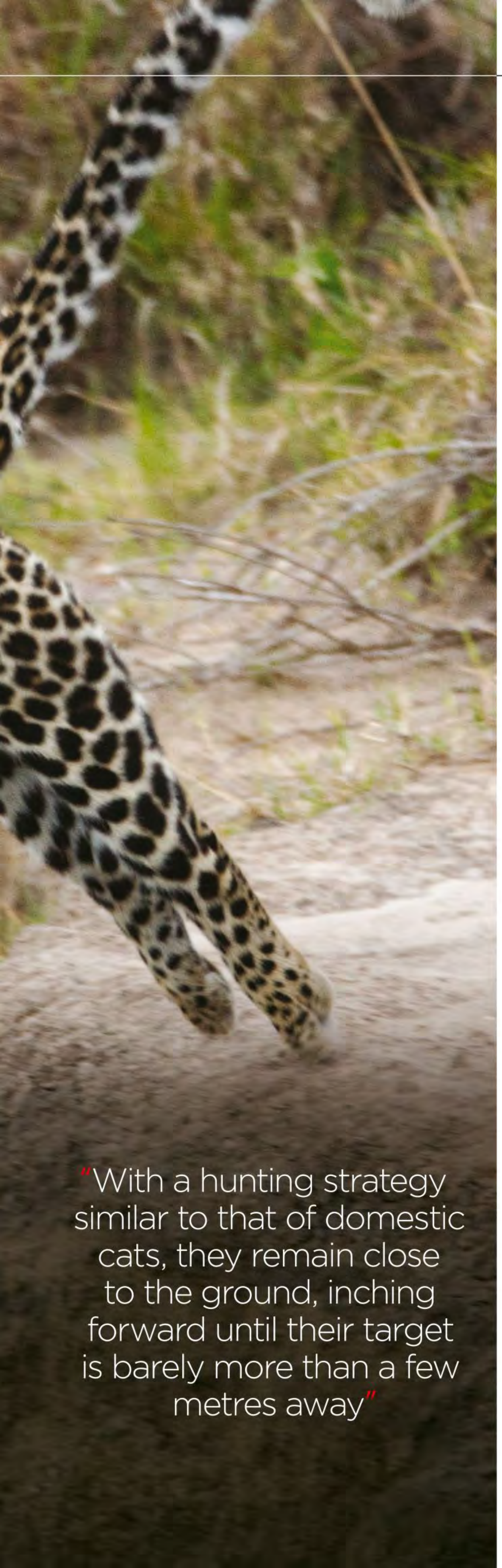
Leopards might not be the strongest of the big cats, or the fastest, but what they lack in power, they make up for in agility. They are nimble ambush predators capable of jumping six metres (20 feet) in a single bound.

Unlike cheetahs, leopards aren't suited for pursuit, so rely on a quick, powerful strike to disable prey. With a hunting strategy similar to that of domestic cats, they remain close to the ground, inching forward until their target is barely more than a few metres away. Then they pounce, pinning the animal to the floor.

Competition for food is fierce, so after a hunt leopards are vulnerable. Lions and hyenas scavenge in groups, intimidating solitary predators to steal their kills. Alone, the cats stand no chance against these aggressive teams of carnivores and if confronted their only option is to retreat. After a kill, leopards use their jaws to haul the carcass into the high branches, often lifting more than their own body weight. They have relatively short legs and their centre of gravity is low, so using their sharp claws as crampons, along with their thick tails for balance, they can reach tree branches well beyond ground-based hunters. From the safety of the treetops there's little threat and the cats often store their kills in the branches.

Not only do leopards have to worry about treats from other carnivores, competition among their own species is also fierce. As solitary hunters, they require large territories to catch enough prey, so defend these areas fiercely. With a combination of scent-marking, low-pitched saw-like calls and fighting, leopards ensure that they have exclusive access to the prey animals in their local area.

There's not always time to drag a large carcass to safety, so the cats are often forced to abandon their kills to stronger animals. Pack hunters such as hyenas are chaotic eaters, spending almost as much time fighting among themselves as eating, so it's sometimes possible for the leopard to retrieve at least part of their kill amid the chaos.



"With a hunting strategy similar to that of domestic cats, they remain close to the ground, inching forward until their target is barely more than a few metres away"

Aerial assault

Leopards don't just hunt on the ground and will sometimes pounce straight from the trees

In the shelter of the sometimes leafy branches, leopards become almost invisible to animals below. They lie in wait, watching as prey move about on the floor. If an unfortunate animal comes within range, they strike, leaping down from the branches.

Vantage point
The ability to climb gives leopards a huge advantage over ground-based prey animals, enabling them to watch and wait, unseen, in the safety of the branches.

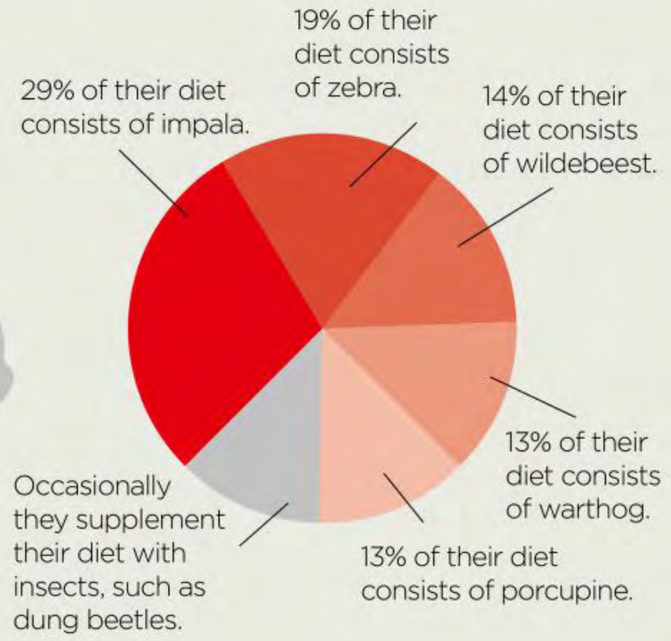
Lethal strike
They will pounce several metres from the trees to the ground, using their powerful front legs to grapple their prey to the floor, before inflicting a deadly bite.

A big cat diet

Leopards are skilled hunters and eat a wide variety of food

An average male leopard eats
3.5kg / 7.7lbs *of food per day*

That's 5% *of its body weight*



Protective instincts

Leopard mothers work alone to feed and protect their cubs

Leopards are solitary animals, but breeding males and females remain together for days at a time, sharing each other's food and company.

When a female is in heat, she attracts male attention with pheromones in her urine. Over the following days the couple mate frequently, sometimes up to 100 times in a 24-hour period, ensuring that they have the best chance of producing cubs.

Gestation lasts for around 100 days, but the male leopard doesn't remain to see the birth of his offspring. The new mother is forced to continue hunting while her cubs develop, leaving the den unattended for periods of up to 36 hours at a time.

Left alone, the cubs are vulnerable. Lions, for example, are aggressive opponents, deliberately eliminating the competition in order to secure access to the best food. This means finding a safe location for the den is crucial and pregnant females take advantage of their agility to find a den unreachable by less-nimble predators.

As the cubs grow, they begin to venture outside, but it takes almost two years for them to reach independence. Climbing is mastered quickly and provides a small degree of protection when their mother is away, enabling the cubs to scramble into the trees if threatened.

Male leopards are aggressive and territorial, so when hunting boundaries change hands any cubs in the area become targets. Rather than allow the females to waste resources on cubs belonging to rivals, males will kill them, forcing the females to become fertile again.

The first few weeks of leopard life

Leopard mothers give birth to an average of two or three cubs in a litter. For the first few weeks their eyes are closed and they are unable to walk, making them entirely dependent on their parent for care.

The cubs aren't born with their adult markings, so instead have a mottled greyish coat, which provides some camouflage in the rocky areas where leopards make their dens. However, until they are able to climb, they are entirely defenceless and the female devotes significant time to moving the den site, keeping them hidden from view.

Early blindness
Leopard cubs are born blind and do not open their eyes until they are ten days old.

Unsteady
The cubs are unable to walk for the first two weeks, so instead their mother must carry them in her mouth.

Juvenile camouflage
The cubs' rosette markings are blurred and their juvenile fur is silvery grey, helping them to blend in with the surroundings.

Guarding their young

Leopards have a lethal bite, but are still able to carry delicate cubs in their mouths

Female leopards raise their cubs alone and are responsible not only for protecting them, but also for providing food. Their maternal instincts mean they'll support their young as long as is needed, and will keep a watchful eye over them whenever they can.

In order to hunt, mothers must leave their dens unattended and vulnerable. When alone, the cubs must fend for themselves and many succumb to predation.

On the move
Mothers move their cubs to a new den every few days to mask their scent.

Gentle grip
Leopard jaws are powerful, but their canines aren't razor sharp, so with a gentle hold no damage is done to the cub's delicate skin.

By the scruff
The loose skin at the nape of the neck has very few nerve endings, enabling the female to grip her cubs without hurting them.

Going floppy
When they are being carried, the cubs hang limply and do not struggle.

The leopard's den

Choosing the right den location is crucial if the young cubs are to survive

Staying hidden
The best survival strategy for leopard cubs is to remain hidden. The markings on their coats are blurred, and their silvery-brown colouring provides camouflage, but the main problem is the smell. Predators have keen noses, so in order to mask the scent of the cubs the mother must find a new den every few days.

Inaccessible location
Leopards hide their cubs in rocky crevices, hollow tree trunks, dense undergrowth and caves.

Climbing trees
Leopards spend their adult lives in the trees and begin climbing at a young age. While their mother is away from the den, the ability to climb is one of the only defences cubs have against predators.

Learning to hunt
When the cubs are a few months old, they begin to venture out of the den, practising their hunting skills on anything that moves.

Life in the savannah

Leopards are at their best in the dappled shade of grassy savannah or forest, where prey animals are abundant and there are lots of places to hide. However, these adaptable cats can survive almost anywhere, from the tropical Congo rainforest to the deserts of Namibia, to the snowy mountains of China and Russia.

Leopards are the most widespread of the big cat species, vastly outnumbering lions and tigers in the wild. Their range extends across Africa, into central Asia, up towards Russia and even down into Indonesia and Malaysia.

In general these adaptable cats are able to resist minor disturbances in their environment and are quickly able to change their hunting range or strategy to cope with new problems, but the level of habitat destruction has decimated many populations. In northern Africa the remaining leopards are struggling to survive and in many parts of Asia numbers are dangerously low. As an example of the problem, Javan leopards have less than 3,000 square kilometres (1,300 square miles) of habitat left.

Five out of the nine subspecies of leopard are categorised as Endangered or Critically Endangered, and the Amur leopards are close to extinction. They live in the snowy mountains on the border between Russia and China and have been so aggressively hunted for their valuable pelts that the number of adults in the wild is now less than 30. In 1999 Amur leopard skins were selling for up to $1,000 in local villages – despite conservation efforts, the animals are still being killed by poachers, with four additional casualties in the last seven years.

In comparison, the leopards of sub-Saharan Africa are thriving, but they face environmental threats of their own. With such high numbers of animals, contact with humans is inevitable, so there is growing tension between leopards and human populations. Hunters strip the environment of prey animals, capturing wild meat for sale at markets and depriving the cats of their natural prey. The resourceful animals then turn to domestic livestock for food and farmers retaliate with guns or poisons.

Many African countries limit the exporting of leopard skins in an attempt to control poaching and national legislation protects them in their natural habitat, enabling legal action to be taken against hunters. Despite this, outside of protected areas the cats are vulnerable and the future of some is uncertain.

> "Outside of protected areas the cats are vulnerable and the future of some is uncertain"

Environmental factors

Several sub-species of leopard are now in a critical position and face constant environmental threats

Hunting
Leopards are one of the big five game animals in Africa – the species most prized by hunters. Their elusive nature makes them hard to track, attracting trophy hunters from across the globe.

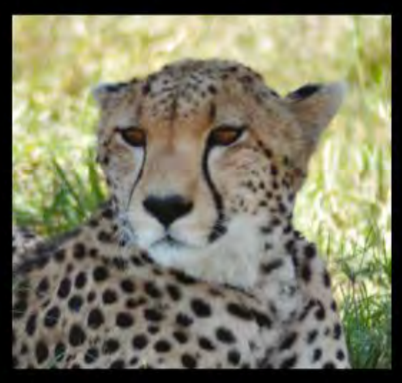
Human conflict
The big cats are highly efficient predators and will prey upon domestic livestock if the opportunity arises. Farmers often retaliate with lethal force, killing the offending leopard.

Illegal poaching
Leopard fur is highly prized, so poaching remains a problem in Africa and Asia. Between 2002 and 2003, six Amur leopard skins were seized and only 35 adults remain in the wild.

Habitat destruction
Logging is decimating leopard habitats across Asia and prey animals such as deer and rabbits are hunted for meat and skins, reducing the food available for the remaining cats.

Nearest neighbours

Leopards inhabit a variety of environments and share their homes with a large range of other spotted cats



Cheetah
In Africa leopards live alongside the fastest living land animals. Cheetahs are similar in size to leopards, but are much more slender, with long legs and powerful bodies, built for short bursts of intense speed.

Clouded leopard
In the foothills of the Himalayas, leopards and clouded leopards share the terrain. Despite sharing a name, and a home, the two species are actually not that closely related.

Serval
These small cats are native to Africa. With their tawny fur, round ears and black spots, they are often mistaken for leopards from a distance, but their legs are much longer, enabling them to run at high speed through the grass.

Leopard cat
These wild cats have similar colouration to leopards, but are much smaller, at around the size of a domestic cat. They inhabit a wide area, extending across south and east Asia.

A graceful cat with remarkable physical strength and prowess, it's a sad fact that the dwindling numbers of such an incredible beast have put it on the brink of extinction

SECRETS OF THE SNOW LEOPARD

Snow leopard

Big Cats

Roaming the rugged mountains of central Asia, the snow leopard prowls with vigour and grace. A subtle and mysterious inhabitant of some of the harshest terrain on the continent, the feline is now regrettably synonymous with desperate conservation efforts, in yet another infamous fight against total extinction. A catastrophic mixture of poaching and habitat loss has whittled the cat's numbers down to only 3,500 to 7,000 left in the wild.

Dr. Rodney Jackson has over 30 years of experience studying and saving the beautiful creature. It hasn't been easy, since this has involved working in the mountain ranges, mostly on foot and for months on end. "They live above 12,000 feet [3,660 metres]," he says. "The more cliffs there are, the better the snow leopards will love it, which brings real problems for me because I really fear heights." Despite their name, the big cats don't actually live in the snow, but reside in some of the driest and the coldest areas in the world, from southern Siberia to Afghanistan, to China and the Himalayas. They are designed to withstand cold climes, however, with thick woolly coats and enlarged nasal cavities that heat inhaled chilly air. Also, while snow leopards may not roar like other big cats, they are from the same family as tigers and other large felines, so they're facing similar threats from human interference.

SNOW LEOPARD
Panthera uncia
Class Mammalia

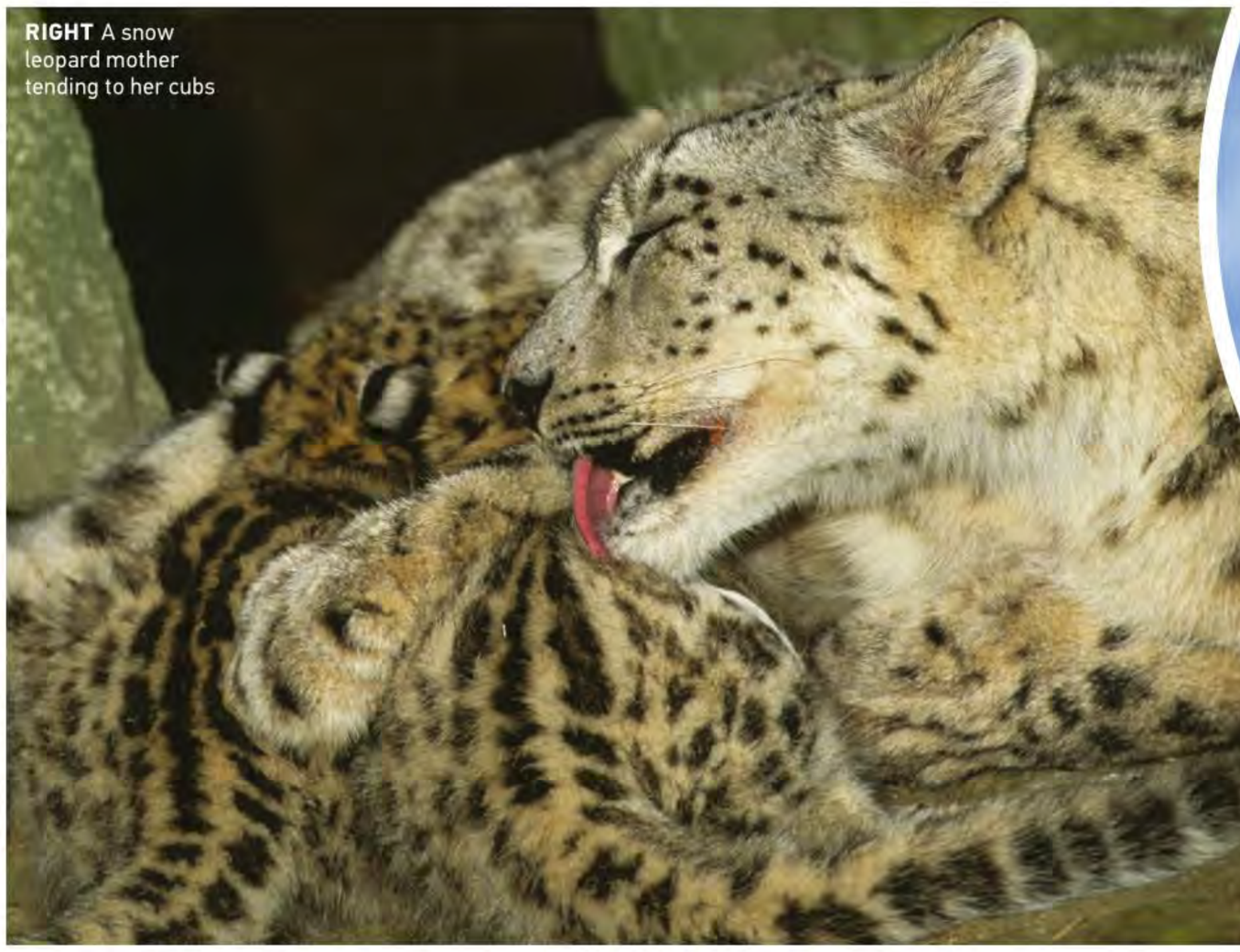
Territory Mountains of central Asia
Diet Carnivore
Lifespan 15-18 years
Adult weight 54kg / 120lbs
Conservation status

EX EW CR EN VU NT LC

ENDANGERED

BELOW Rodney Jackson and B. Munkhtsog with a sedated snow leopard in Mongolia 2008

"One of the major problems is that the natural prey base for the snow leopard has been depleted or reduced by poaching, such as the blue sheep or the ibex that people hunt for meat," Jackson explains. "Humans have displaced them out of their habitat with their livestock, so just by chance alone the snow leopards are going to encounter livestock." The



RIGHT A snow leopard mother tending to her cubs

> "Snow leopards are superb athletes that are capable of leaping as far as 50 feet through the air"

animals are kept inside dry stonewalls that these big cats can easily scale. Snow leopards are superb athletes that are capable of leaping as far as 15 metres (50 feet) through the air, which is ideal for pouncing on prey at a distance. Once inside these livestock pens, the goats and sheep don't stand a chance. "Livestock have very poor predator-avoidance behaviour," Jackson continues. "Their sense of smell isn't great, they don't know to run away, they don't know to clump up, so they fall victim to a wolf or a snow leopard very quickly. These enclosures create an artificial situation because the animals can't run away. They're contained in a pen, so a predator's killing instinct is repeatedly triggered until there's nothing moving in there." This has led local people to wrongly believe snow leopards are bloodsuckers and that they don't eat meat at all.

In a place where money is measured in livestock, this sort of incident can be devastating to a family. People depend on livestock for food, clothing and transport. The population, 40 per cent of which lives below the poverty line, are effectively subsidising one of the most endangered creatures in the world. Jackson sympathised with their plight and so set up the Snow Leopard Conservancy in 2000 to address these human-animal conflicts. "The general solution, which remains even today,

LEFT Rocks are perfect for ambushing prey

Threats to survival The greatest dangers the snow leopard faces

Poaching
No one looks better in a fur coat than the animal wearing it, but sadly people in central Asia, eastern Europe and Russia will pay high prices to have it made into garments. Not only that, but the snow leopard's bones and other body parts are in demand for traditional Asian medicine. The animal is protected in all its range countries, yet the laws are rarely upheld.

Loss of habitat
People heavily depend on livestock for their income but the more animals they keep, the less wild grass there is for the snow leopard's natural prey to eat. This has a knock-on effect, reducing the numbers of ibex and blue sheep in the area. The snow leopard is forced to prey on domestic animals in a bid for survival, which increases human-cat conflict.

Retribution killing
The snow leopard's natural prey includes the ibex or blue sheep, but no wild animal is going to turn its nose up at a free meal, especially when it's so easy to catch. If domestic livestock isn't sufficiently protected, then a farmer's livelihood can be wiped out with a single attack. Few families can afford this loss, so local people turn to hunting this creature as a result.

Built to survive

How this incredible cat is built to thrive in the high, rugged mountains

Camouflage coat
The fur's colour enables the cat to hide in its natural environment. Its belly fur grows up to 12 centimetres (five inches) long.

Impeccable eyesight
A snow leopard's eyes are green or grey rather than golden yellow. They also have excellent eyesight that's six-times better than human's.

A tail gives balance
The long tail can measure up to a metre (39 inches) long and helps the cat keep its balance in the steep mountains. It also wraps the appendage around itself to keep warm.

Large nostrils
Snow leopards have unusually large nasal cavities that help them breathe at high altitudes. It also warms the cold air before entering the cat's lungs.

Longer hind legs
A snow leopard's hind legs are longer than its front limbs. This is so that the big cat can jump up as far as 15 metres (50 feet) up in the air to manoeuvre or catch prey.

Sturdy paws
These extra-large paws distribute their weight evenly, so the animal doesn't sink in the snow. These effective snow shoes are also covered in fur to keep them warm.

LEFT A mother and cub share a fresh kill, with the female snarling at a rival

is to compensate people for the loss of livestock, but the problem is that this isn't sustainable. It's something you'll have to do forever, so where's the money going to come from? Our approach is trying to address the root cause for that loss and to improve people's livelihoods so they are better able to sustain some economic loss from a few animals here and there and not be dependent on external sources of income, or the government."

By working with the communities, Jackson identifies the main causes for livestock depredation. More often than not it's down to the pens that aren't properly predator-proofed. By helping shepherds to strengthen the walls and add a wire mesh roof, the risk of any unwanted visitors is greatly reduced.

Snow leopards don't pose a threat to humans like they do animals, Jackson adds: "There are no documented incidents of a human being killed by a snow leopard, just a couple of injuries but no actual killing, unlike tigers, lions or other leopards. The wild ones always run away. In fact, very few people have ever seen one; even local people don't often sight them. Where they've been persecuted they have become very secretive, shy and nocturnal."

ABOVE Thanks to the conservation efforts of Dr Jackson and his colleagues, snow leopard numbers are becoming more stable

Snow leopard

"There were spears sticking up from the ground so that any animal coming would jump and impale itself"

As well as educating herders and improving corrals, the Snow Leopard Conservancy also works to develop alternative sources of income. One particularly bright idea is the Himalayan Homestays, transforming local people's lodgings into modest bed & breakfasts where tourists can stay. "They're earning far more from that than they ever have from farming," he says, citing it as one of their biggest success stories. "Families can now send their children to school, as well as improve the village by cleaning it, planting trees and reducing the grazing pressure on the habitat, so there's more for wildlife to forage. It's win-win."

The first time Jackson was walking through the inhospitable terrain of the Langu Gorge in Nepal, he met some local hunters and there was one in particular who had set his sights on this rare animal's highly prized fur. "I noticed there were spears sticking up from the ground so that any animal coming would jump and impale itself," he recalls. "Sure enough, we travelled further over the cliff and buried under the rocks I could see the skinned, frozen carcass of a snow leopard. It was the saddest thing I'd ever seen and it epitomised the threat these cats are facing. That was my inspiration."

These days the snow leopards Jackson comes across are alive and well. By attaching radio collars and leaving camera traps to record images of these cats in the wild, he can already see a difference. "I would sometimes go for three years without seeing one, but I just got back from India where I saw five snow leopards in ten days," he says. "There's definitely a positive change, but there are still a number of threats. There's Asian demand for the bones, fur and body parts of wild cats for medicinal and clothing purposes, but the supply can't possibly meet the demand. Snow leopards often become a substitute for tigers and that's a big issue."

This big cat inhabits around 12 different countries and the Snow Leopard Conservancy is active in six of these, so Jackson is hoping other organisations will step in, but one thing's for certain, he won't be giving up. He's been tracking big cats since his childhood and over 30 years on he's not about to stop now. "The public needs to be aware that many of the world's endangered animals are large cats or predators," he says. "Many live overseas or in developing countries, so we need to work together to help protect them."

See the snow leopard

IN THEIR NATURAL HABITAT

Ladakh Snow Leopard Trek

www.dreamladakh.com/snow-leopard-trek.htm

Dreamland offers a great 11-day excursion to spot snow leopards in the Hemis National Park in Ladakh, where you'll also have the change to spot the Himalayan blue sheep, the Asiatic ibex, the red fox, the Tibetan wolf and other big cats like the lynx and Pallas's cat. The best time to spot a snow leopard is between October and March, and prices vary depending on the size of your group. Keep in mind that this trip is only suitable if you're fit enough to scale the high mountains; the highest point, the Stokla Pass, is 4850 metres high.

IN THE UK

Zoos and wildlife parks nationwide

Visit snow leopards at Twycross Zoo – an award-winner of Best Enclosure for its Himalaya project, a snow leopard enclosure. Other BIAZA members with snow leopards include Marwell Wildlife, Dublin Zoo, Banham Zoo, Welsh Mountain Zoo, Dudley Zoo, Paradise Wildlife Park, Lakeland Wildlife Oasis and Linton Zoo.

All About

The Amur leopard

Driven to the very edge of extinction and facing a multitude of threats, the rarest leopard in the world is making a tentative comeback

Elusive and solitary

With fewer than 60 left in the wild, the Amur leopard is a rare sight to see

Few people have ever had the good fortune to see an Amur leopard in the wild. Their numbers currently stand at around 60 individuals, most of them prowling the province of Primorsky Krai in southeast Russia, with a few over the border of northeast China and potentially some leopards in North Korea. The amount of Amur leopards reached a shocking low of 30 individuals in 2007, but dedicated conservation work has helped that figure double in the last few years.

Like most other species of leopard, Amur leopards are solitary creatures and require a lot of space to hunt and raise young without competing with other leopards for food and territory. The species experienced a dramatic reduction of its Russian range during the 1970s, losing about 80 per cent of its territory and becoming highly fragmented. This in turn made it harder for individuals to breed successfully.

The temperate forest habitat – which can reach deadly lows of -25 degrees Celsius (-13 degrees Fahrenheit) – has set the Amur leopard apart from other *Panthera pardus*. It has slightly longer legs for navigating heavy, dense snowfall, and for camouflage its winter coat is a fairly light yellow with a gold tinge, paler than other leopard subspecies and much thicker in order to keep out the cold.

The Amur leopard does not pass the coldest winter months by hibernating, but rather follows herds of ungulates. Despite its vast range, an Amur leopard will not stray far from its prey – all year round, wherever sika and roe deer can be found, leopards are sure to be following. Male leopards have even been seen fighting viciously over territory that includes an area where deer husbandry is practised. As a crepuscular animal (most active during twilight) the leopard is able to utilise low light as cover when hunting. Leopard's employ stalking tactics when on the hunt, aiming to get as close as possible before pouncing with their front paws extended and biting the back of the prey's neck. Once they latch on, their prey doesn't stand a chance. With the nightly hunt over, Amur leopards spend the daylight hours resting in caves or underbrush.

The Amur leopard spends much of its life alone. Leopard cubs are raised exclusively by their mother for the first two years of their life, before embarking on a journey to carve out their own territory. Young leopards become sexually mature up to a year after they gain their independence. Mature leopards may only meet each other when a female comes into season or on the rare occasion when some territories overlap. Despite this rather lonely existence, leopards who have never met may still recognise each other from scent markers left on hunting trails and migratory routes.

Amur leopard in numbers

1961
The year the captive population was founded

2 years
Years a cub spends with its mother

90-105 days
Days of gestation for a female

2-3 CUBS
Average litter size of an Amur

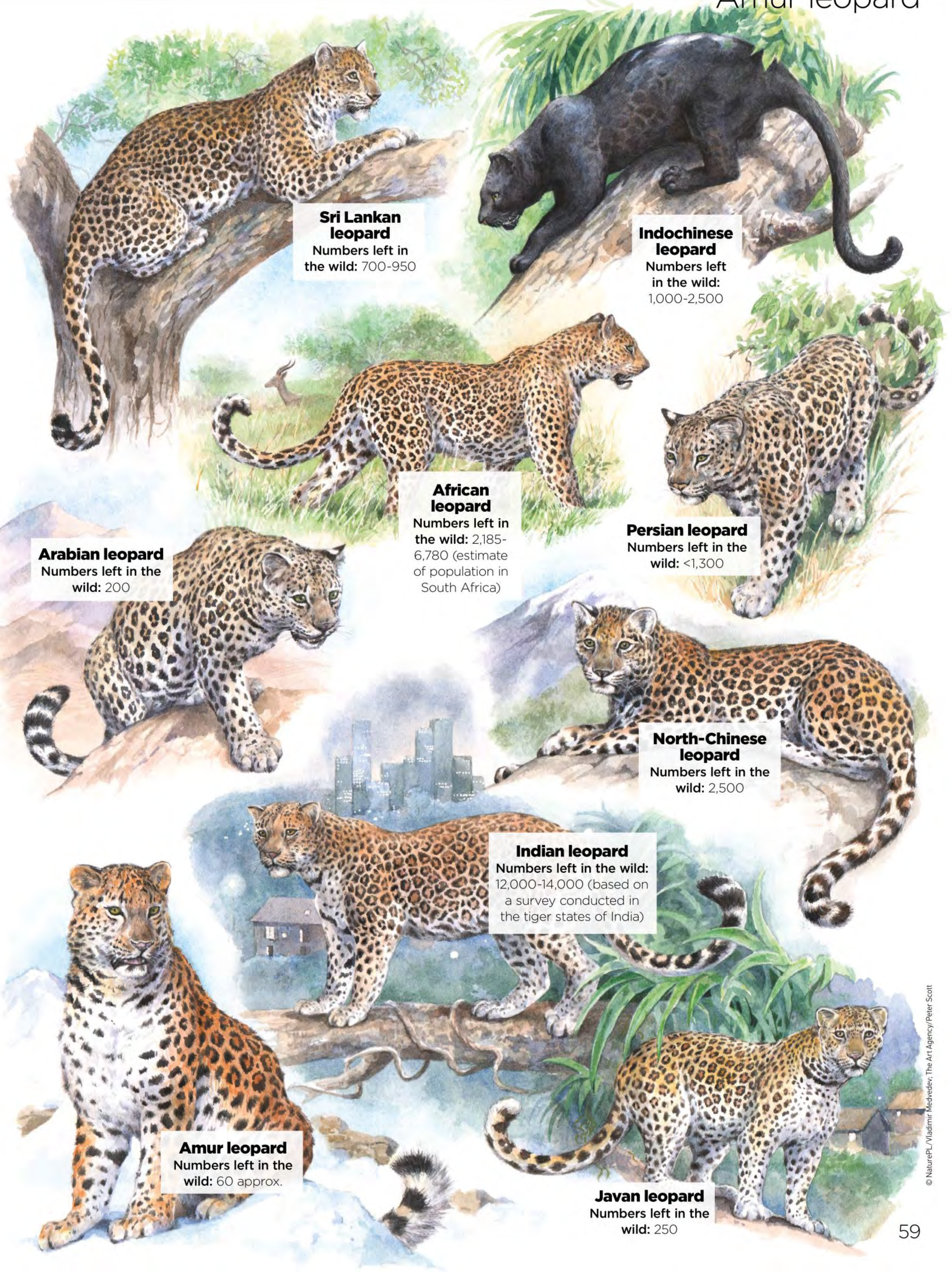
60
Number of Amur leopards left in the wild

7-12
Wild individuals estimated still living in China

200
Number of Amur leopards in captivity

19-26 LEOPARDS
Amur leopards in the wild in 2007

The Amur leopard is uniquely adapted among its species for life in the snow



Sri Lankan leopard
Numbers left in the wild: 700-950

Indochinese leopard
Numbers left in the wild: 1,000-2,500

African leopard
Numbers left in the wild: 2,185-6,780 (estimate of population in South Africa)

Persian leopard
Numbers left in the wild: <1,300

Arabian leopard
Numbers left in the wild: 200

North-Chinese leopard
Numbers left in the wild: 2,500

Indian leopard
Numbers left in the wild: 12,000-14,000 (based on a survey conducted in the tiger states of India)

Amur leopard
Numbers left in the wild: 60 approx.

Javan leopard
Numbers left in the wild: 250

Inside the Amur leopard

Amur leopards are adapted to survive and thrive in conditions unlike anything their fellows in the Panthera genus experience. Beneath their fur is the musculature of a hunting machine, built to pounce, prowl and tear apart prey

Caudal muscles
The caudal muscles control the movements of the leopard's tail – the muscles are attached to the tail vertebrae with tendons, giving the tail a variety of movement.

Tail
Leopard tails are very flexible and their movements are a way for individuals to communicate with each other. An Amur leopard's furry tail also works as protection against the cold.

Neck and shoulder muscles
Powerful neck and shoulder muscles allow the Amur leopard to carry prey that is almost as heavy as the cat itself. This allows the leopard to stash carcasses in trees and caves.

Fur
The Amur leopard's thick, spotted fur, which helps it to survive harsh winters, sets it apart from other leopard subspecies. It can grow up to 7cm (2.8in) long in winter.

Ankle

Heel

Hind foot

Claws
Like other feline species, the Amur leopard has retractable claws. Retracting claws protects them from going blunt when walking on rough ground, helping to keep them sharp for climbing trees and grabbing prey.

AMUR LEOPARD & FAR EASTERN LEOPARD
Panthera pardus orientalis
Class Mammalia

Territory Southeast Russia
Diet Roe and sika deer, badgers and hares
Lifespan 10-15 years
Adult weight 32-48kg (71-106lb)
Conservation Status

EX EW CR EN VU NT LC
CRITICALLY ENDANGERED

INFANCY

Growing a litter
Before birth
Amur leopard gestation is around 90-105 days long, resulting in a litter of two or three cubs.

Seeing the world
7-10 days
Cubs are born with their eyes closed and they don't open until at least a week after birth.

On the move
12-15 days
After approximately two weeks, cubs begin to crawl, though they are still very vulnerable.

JUVENILE

Leaving the den
2 months
After two months, a leopard cub is strong enough to emerge from the den and begin eating meat.

Learning to hunt
3 months
The leopard cubs begin a year-long study of their mother's hunting skills.

Becoming independent
18 months-2 years
At this time the juvenile is ready to leave its mother or has perhaps been driven away.

Amur leopard

Jaw
A leopard's jaws are strong enough for them to pierce through the neck of its prey. Feline jaws can only move vertically, which helps them keep a stronger hold on prey.

Scapula (shoulder blade)

Eyes
All felines have reflective eyes that shine distinctively and the Amur leopard is no exception here. They have incredible night and low-light vision, though they cannot distinguish fine detail.

Whisker bed
Whiskers are an extra field of sensory input for leopards to process. They enhance a cat's spatial awareness and provide information on the movement of the air around them.

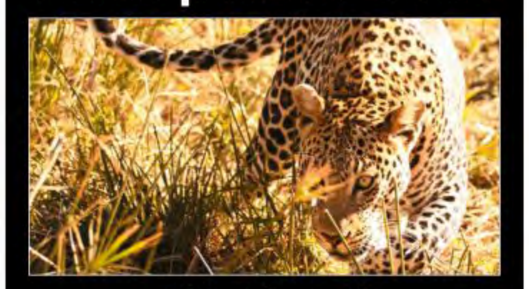
Teeth
Leopards have relatively few teeth but they are all designed to cut and tear meat. They have no flat molars, which are used by herbivores and omnivores to chew vegetation.

Dew claw

Ribcage

Elbow/Olecranon

A leopard's coat



African leopard
Their coat colour can be a light pale yellow

African leopard (melanistic)
A melanistic African leopard's spots are still visible

Persian leopard
The Persian leopard's fur varies in colouration, from pale to dark

"Leopards employ stalking tactics when on the hunt, aiming to get as close as possible before pouncing"

MATURITY

Gaining territory
2-3 years
The young leopard is now sexually mature and must carve out its own territory.

Mating season
3.5 years
Amur leopards will typically breed in January and February.

A solitary life
Outside of breeding season, Amur leopards are solitary creatures and are only active at night.

A long life
12-17 years
Their average lifespan is unknown, though other subspecies live 12-17 years.

Nearest neighbours
Amur leopards share their habitat with many other creatures

Sika deer
Also known as spotted deer or Japanese deer, sika deer are native to most of East Asia. Prey to the Amur leopard, on the Asian mainland they are uncommon and some subspecies are possibly extinct (though they are abundant in Japan).

Siberian tiger
The wild Siberian tiger population (also known as the Amur tiger), currently consists of 562 individuals. It shares some of the same habitat as the Amur leopard and when there are shortages of prey, tigers will resort to killing leopards.

Manchurian wapiti
The Manchurian wapiti is a small eastern Asian subspecies of the North American wapiti, or elk. It has stout little wapiti-like antlers and a neck mane (on the males). Their range extends from Siberia and Mongolia through to China and Korea.

Habitat loss and poaching

This skilful hunter has not only had to adapt to the harshest conditions of its territory, but it also faces the loss of its habitat and being poached for its beautiful spotted coat

Life in the Amur (Heilong) river basin in northeast Asia is full of hardship, for both animals and humans. What makes the Amur leopard so distinctive is the way that it has adapted to survive in its environment. Its wide, snowshoe-like paws and big bushy tail (which works like a furry scarf) help this cat to keep going in the cold conditions.

The region it inhabits is also home to some of the world's largest expanses of intact temperate forest and it is also where the elusive Amur (Siberian) tiger can be found in the wild. The habitat supports an incredibly varied range of wildlife, but it is under threat from all sides.

Improper forest management, mining and logging all threaten the Amur leopard's home. The effects of this human activity start at the bottom of the food chain, where the prey populations are too low to sustain more leopards. Prey populations can only recover once logging is managed sustainably and poaching of integral prey species, such as sika deer, is curtailed. Populations of Amur leopards and tigers can only recover once prey populations have regenerated.

The illegal wildlife trade is one of the biggest threats to the leopard's survival. Villages and farmland surround the forests, which means that access to the leopard's habitat can be relatively easy. And poachers will not only seek Amur leopards for their spotted fur, but also take sika deer and roe deer for their meat and the money their carcasses can bring. In Russia in 1999, an undercover investigative team recovered two Amur leopard skins put up for sale – a female's skin for $500 (£400) and a male's skin for $1000 (£800). To combat this criminal activity and save the dwindling Amur population, the Russian government established the Land of the Leopard National Park in 2012.

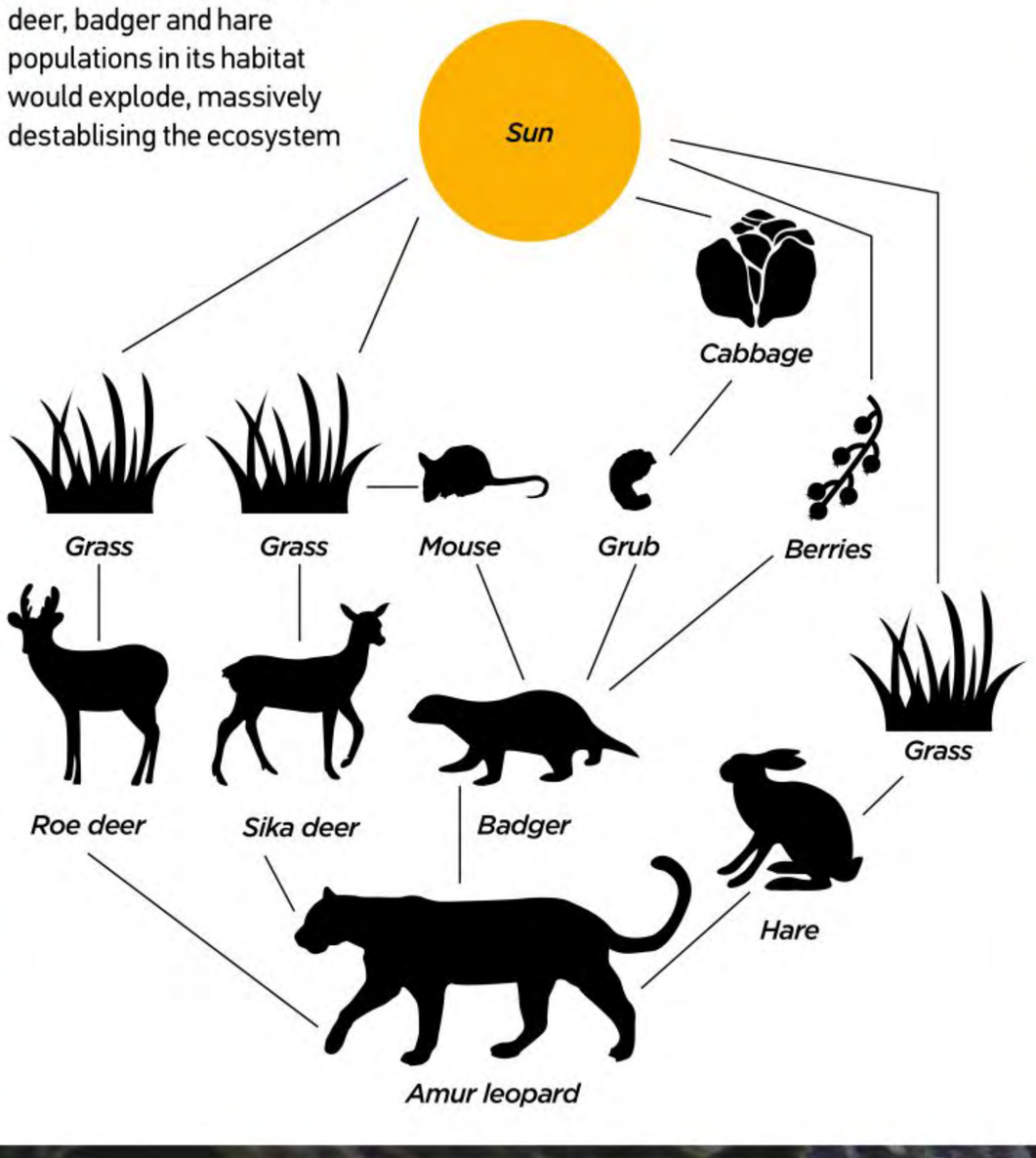
The protected area comprises of 262,000 hectares (647,416 acres) of land in the southwest Primorsky province, covering approximately 60 per cent of the leopards' habitat – enough space to ensure the survival of at least 50 individuals (including ten Amur tigers from China). The territory also includes integral leopard breeding grounds.

The Amur Leopard and Tiger Alliance (ALTA) is also hard at work conserving the rarest of wild cats. The Amur Tiger Conservation In Russia 2015 project aimed to keep tiger and prey populations stable by improving patrolling and reducing poaching. The ALTA are working with partner organisations to establish a second population of Amur leopards in their former range.

BELOW While not apex predators (due to predation by tigers), Amur leopards sit at the top of the food chain

Vital to their ecosystem

Without the Amur leopard, deer, badger and hare populations in its habitat would explode, massively destablising the ecosystem



Disappearing habitat

The estimated wild Amur leopard habitat is a mere 5,000 sq km (1,930 sq mi)

- *Historical range*
- *Current range*

Conserving an icon

Giles Clark is the director of cats and conservation at the Big Cat Sanctuary, which is part of the European Endangered Species Breeding Programme (EEP)

What is The Big Cat Sanctuary doing to help Amur leopards?

We have historically contributed to the coordinated breeding programme by having two recommended litters born and bred here, as well as holding a number of individuals at any particular time. We are very proud of not only these achievements but also our association with the EEP. The cubs that have been born here have gone off to zoos all around the world and continue to be part of the international breeding programme. Some have even had their own cubs.

How does keeping leopards in captivity help with their conservation?

There are a multitude of ways in which the captive population contributes to their conservation in the wild. They help through education and raising awareness, but also by generating support and funding that can be used to aid in-situ conservation efforts. By having coordinated and collaborative breeding programmes, we are ensuring that we have the greatest genetic diversity within the programme. Not only does this create an insurance population in case they [Amur leopards] become extinct in the wild, but also the healthiest population for potential reintroduction back into their formal range in the wild.

For the full interview visit **www.animalanswers.co.uk**

Environmental factors

Many challenges threaten the existence of the Amur leopard

Forest degradation
Repeated burning of forests by humans has changed the landscape. In some places, open grassland has been created – a place that deer (and therefore leopards) avoid.

Inbreeding
With few leopards left in the wild, inbreeding and insufficient genetic diversity can become a threat. Disease and deformity are more likely to occur as inbreeding continues.

Poaching
Poaching is by far the biggest threat to the Amur leopard's survival. They are hunted illegally because of their beautiful coats. Their skins are traded and sold on the black market.

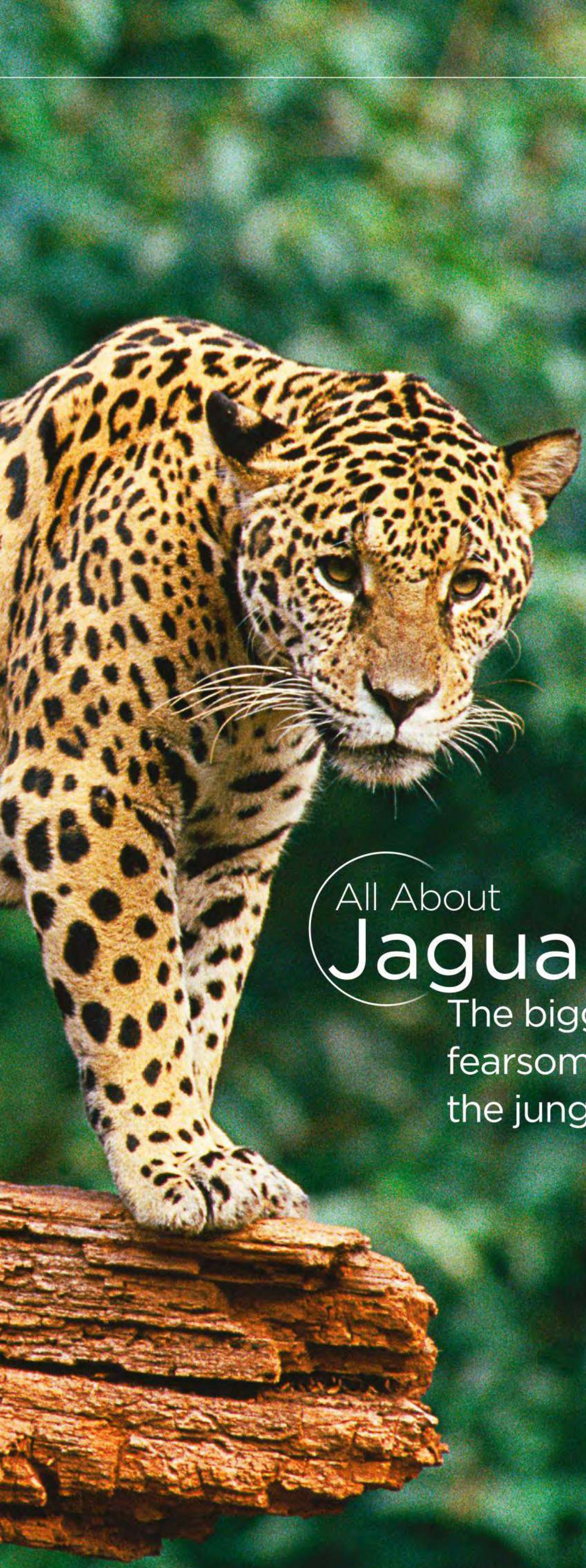
Prey scarcity
Prey populations in China and Russia are currently insufficient to sustain large populations of Amur leopards. For long-term survival, they need to recover their numbers first.

JAGUAR
Panthera onca
Class Mammalia

Territory South and Central America
Diet Small mammals, reptiles
Lifespan 15 years
Adult weight 57-100kg (125-220lb)
Conservation Status

EX EW CR EN VU **NT** LC

NEAR THREATENED



All About Jaguars

The biggest cat in the Americas is a fearsome and solitary predator, stalking the jungle in search of meat

Survival of the fittest

The spotted cats of the Amazon have specialised skills for survival, from retreating to the treetops to hunting what the weather brings

These cats are crepuscular, meaning they are most active at dawn and dusk. They can break this rule if they need to, and can be out and about at any time of the day. Like the average house cat, a jaguar spends the mid-morning and afternoon dozing. It curls up under thick vegetation for protection while the midday sun beats down. Though many people believe that jaguars regularly sleep in trees, they mostly only take to the canopy in times of flood.

Jaguars rely on staying near water, as much of their prey is found along the riverbank, or even in the water itself. It's also useful when temperatures spike and the cat needs to cool down. A male jaguar maintains a territory of up to 80 square kilometres (30 square miles), and females defend ranges of around half that size. The boundaries of their patches are marked with urine, scrape marks and regular vocalisations from the cats. Jaguars are solitary animals and don't tolerate other cats out of breeding season.

These cats are obligate carnivores, meaning they can only eat meat. They feed on at least 85 different species, typically pouncing on an unsuspecting animal from a concealed spot. The prey meets its fate with either a swift bite to the neck or a canine piercing the back of the skull. Jaguar canines are specially designed to deliver a one-shot kill – they are the most robust canines of any cat. Once the prey is dead, the cat drags it to a secluded spot to eat in peace.

The jaguar's diet is heavily influenced by the seasons. During floods, they target large aquatic reptiles called caimans, whose population soars when the rainy season hits. When the water retreats, cattle are let out to pasture and jaguars take advantage of the fields of free meat. However, entering farmland carries the risk of being illegally shot on sight by ranch staff. While some cats specialise in killing cattle, others continue to hunt wild animals. Jaguars only eat once every four days; the bigger their last meal, the longer they will wait for their next.

Jaguar attacks on humans have been documented, but only in situations where the cats have been provoked. If a jaguar encounters a human in the wild, it is more likely to follow the human than attack. It is thought that jaguars track humans travelling on foot to 'escort' them out of their territory.

"The jaguar's diet is heavily influenced by the seasons"

LEFT
A jaguar ambushes an unsuspecting caiman, delivering a powerful bite to the neck

Jungle living

The jaguar is a solitary cat who lives and hunts alone, except for during the mating season

Taking to the trees
These extremely agile cats climb trees with ease, but only tend to seek higher ground when the forest floor is saturated with swamps.

Day of rest
Jaguars beat the heat by resting in the shade or even taking a quick dip.

The hunt
This cat's name is derived from the native American word 'yaguar', meaning 'he who kills with one leap'. It's true, jaguars pick the perfect moment to strike from their hiding spot to secure their kill.

Perfect camouflage
Both spotted and melanistic jaguars blend excellently with the green backdrop.

Cub club
Twins are most common in jaguar pregnancies, and growing up with siblings helps cubs learn social skills and gives them a chance to practise fighting.

A quick dip
Jaguars are more than willing to take the plunge to find food, and even silently swim up to resting animals to catch them by surprise.

Feline attraction

The only problem with being solitary is finding a suitable partner, and jaguars have found a fool-proof method for attracting mates

The best way to advertise your willingness to mate is to shout it from the rooftops, and that's exactly what jaguars do. Female jaguars leave their territory and call out first thing in the morning and last thing at night to let listening males know that they are in season.

Females emit five to seven grunts to advertise their fertility, and males respond with rasping, guttural sounds before beginning to search for the source of the female call. Often, more than one male responds to the call, and sometimes more than one male even accompanies the female for a short while, but this always ends in a fight. Males prove their worth by forcing the other away.

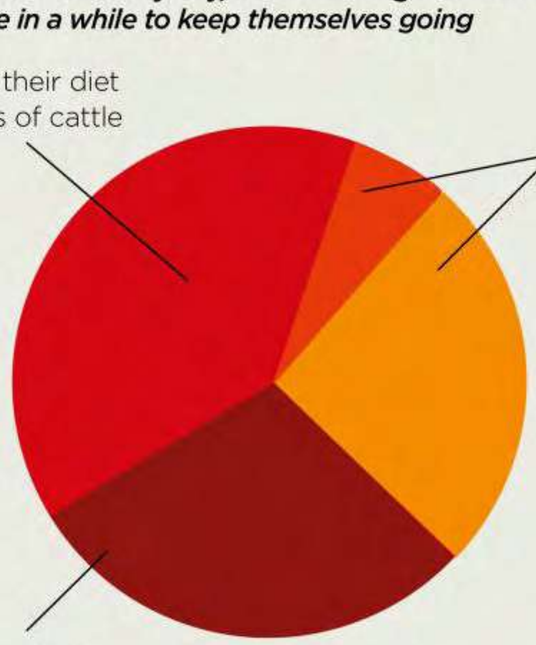
Female jaguars also show changes in their behaviour when they are ready to conceive. The female oestrus cycle lasts 37 days, and the jaguar is able to conceive for between six and 17 of these days. During oestrus female jaguars arch their backs inwards, roll around on the floor and scent-mark more than usual. These signals mean that the female is ready to receive a male.

Jaguars aren't strictly seasonal breeders, and they can conceive at any point of the year. However, male hormones begin to soar when the annual floods begin to recede. The period between December and March is when most mating occurs, as it is the period when prey is most abundant. Expectant mothers must keep up their strength as within 100 days they will have up to four helpless cubs to care for. Mothers don't tolerate male presence once the cubs have arrived, so the more she can eat before the babies arrive, the longer she can stay with her vulnerable cubs without having to go in search of food.

"Male hormones soar when the annual floods begin to recede"

Diet and feeding

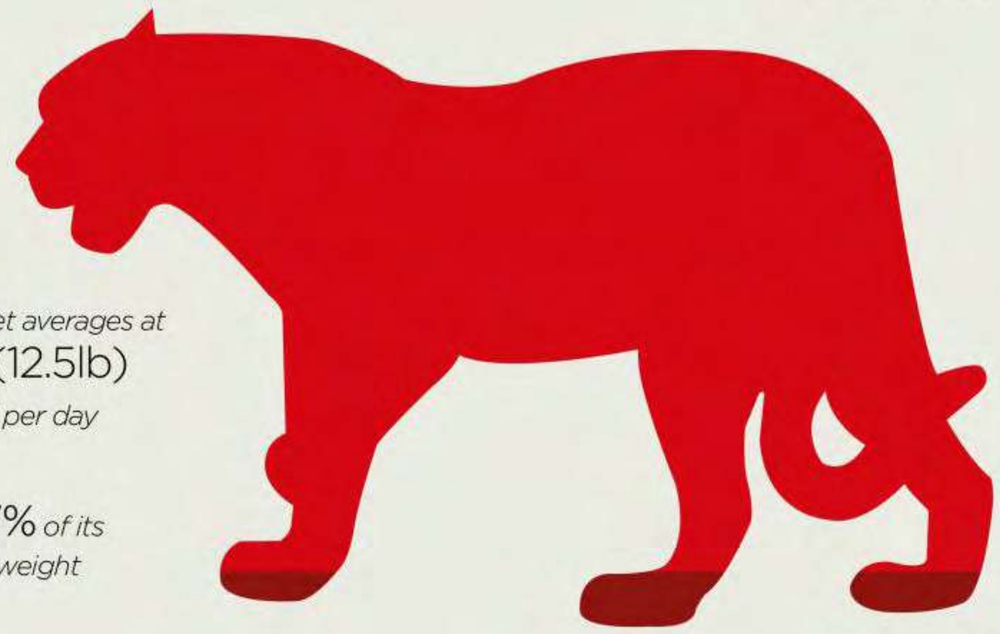
Jaguars don't eat every day, but catch large animals every once in a while to keep themselves going



A jaguar's diet averages at 5.7kg (12.5lb) *of food per day*

That's 7% *of its body weight*

Occasionally they supplement their diet with giant anteaters



ABOVE
A female may travel with two males during oestrus, but one will eventually drive the other away

Black panther or jaguar?

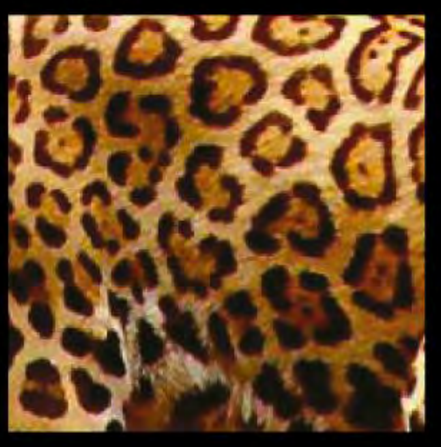
The term 'black panther' can be used to describe a jaguar or a leopard. The term 'panther' can be used to describe any of the four largest species in the Panthera genus – a closely related group of animals otherwise known as the big cats, which includes tigers, lions, leopards, and jaguars. However, of these, only leopards and jaguars are known to have a black (or melanistic) colour variant, and are often referred to as 'black panthers' (see page 84).

Jaguar Vs leopard

What separates a jaguar from a leopard?

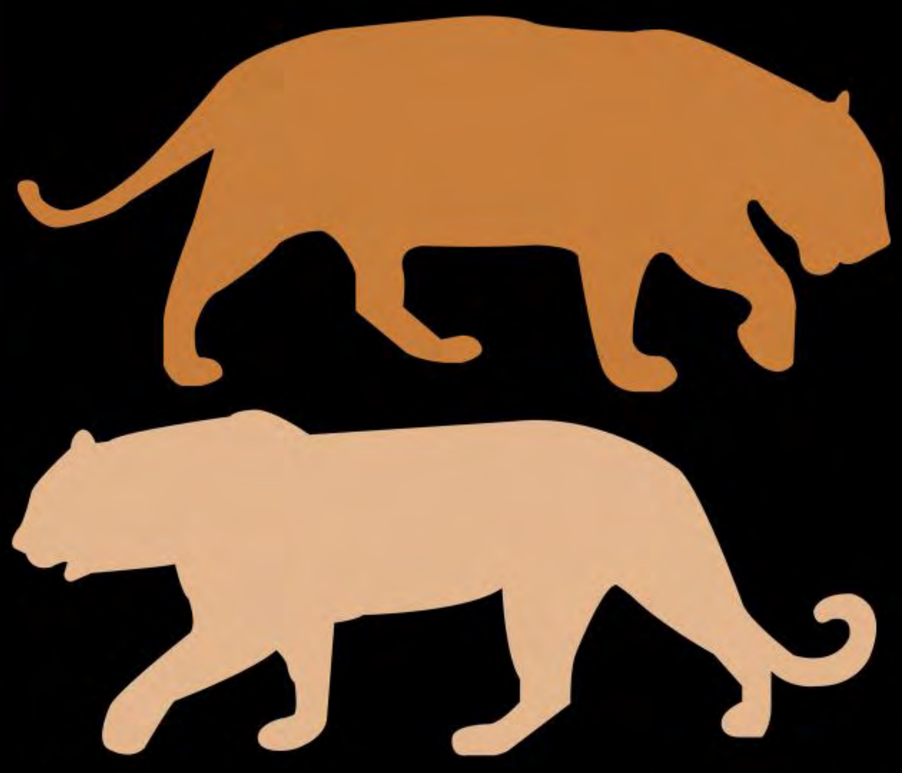
Leopard

Jaguar



Spot size
A jaguar's spots, or rosettes, are larger and more spread out than a leopard's, and sometimes have dots inside them.

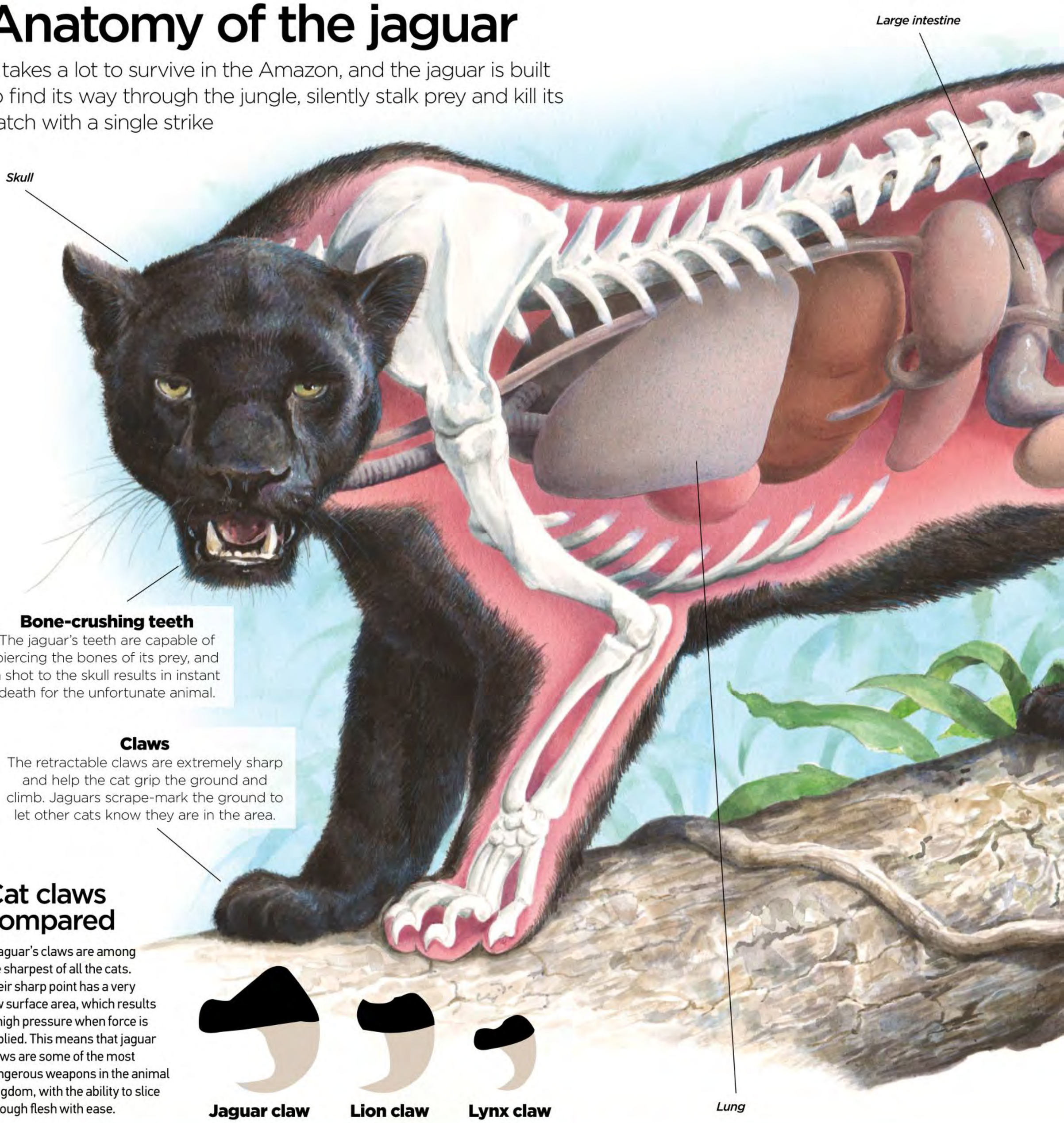
Head size
Leopards kill prey by crushing its windpipe, but jaguars crush its skull. Jaguars get their extra force from a broader head and stronger jaw muscles.



Body size
Jaguars are bigger and stockier than leopards, and have a more obvious curve to their back. A leopard's tail is usually longer than a jaguar's.

Anatomy of the jaguar

It takes a lot to survive in the Amazon, and the jaguar is built to find its way through the jungle, silently stalk prey and kill its catch with a single strike



Bone-crushing teeth

The jaguar's teeth are capable of piercing the bones of its prey, and a shot to the skull results in instant death for the unfortunate animal.

Claws

The retractable claws are extremely sharp and help the cat grip the ground and climb. Jaguars scrape-mark the ground to let other cats know they are in the area.

Cat claws compared

A jaguar's claws are among the sharpest of all the cats. Their sharp point has a very low surface area, which results in high pressure when force is applied. This means that jaguar claws are some of the most dangerous weapons in the animal kingdom, with the ability to slice through flesh with ease.

Jaguar claw **Lion claw** **Lynx claw**

INFANCY

Birth *0 days*
After 90 to 100 days of pregnancy, jaguars give birth to between one and four cubs. Each cub weighs just 0.9 kilograms (two pounds).

Seeing the world *2 weeks*
After 14 days of constant care and attention, young cubs are able to open their eyes and begin exploring. They bond closely with their mother.

First steps *18 days*
Just before the three week mark, jaguar cubs find their feet. They begin to walk and take in more of their surroundings in constant companionship with their siblings.

JUVENILE

Follow the leader *6 weeks*
Around this time jaguar cubs start to follow their mother around. They begin to learn vital skills from her and practise what they see with other cubs.

Weaning *6 months*
Cubs are weaned at this stage, but already begin to sample meat at the age of 10 to 11 weeks. Once their mother refuses them milk cubs have no choice but to eat solid food.

Jaguar

Hearing

Cats have some of the most broad hearing ranges of all mammals. Evidence suggests that they evolved high-frequency hearing without having to lose their low-frequency hearing.

Size

The smallest jaguars are found in Honduras, and weigh 57kg (125lb). The Brazilian Pantanal is home to the largest, weighing up to 100kg (220lb).

Melanism

Black coat colour is a natural phenomenon caused by a mutation in a single gene. 11 of the 37 feline species are susceptible to melanism, and it is common in jaguars.

Strongest bite

Jaguars have the strongest bite of all the big cats. They are able to easily crack open turtle shells and break through animal skulls.

Muscle

Jaguars are built more for power than speed. The large muscles in the legs allow the cat to launch itself at unsuspecting prey.

Digestion

Cat jaws can't move from side to side and their pointed teeth aren't designed for chewing. Instead, food chunks are broken down by enzymes in the stomach.

MATURITY

Leaving the nest *18 months*
After a year and a half cubs strike out on their own. By now, they have picked up the skills they need to hunt and survive in the jungle.

Sexual maturity (female) *2-3 years*
Female cubs are able to breed earlier than males. Even though they have left their mother they still maintain a bond with her for several months.

Sexual maturity (male) *3-4 years*
Mature males listen out for calls from females and find their way to the source of the sound. If more than one arrives at the scene, males compete for the right to mate.

Closest family

The nearest relatives of the jaguar are the extinct lions of North America, but their surviving cousins live across the Atlantic Ocean

Lion
Native to Africa, lions share their genus, Panthera, with jaguars. Unlike jaguars, lions are highly social animals that live in groups and share the responsibility of raising cubs and finding food.

Leopard
The closest relatives of jaguars are their African doppelgangers, leopards. It's thought that big cats moved into the Americas by mistake but thrived on the mammal prey available.

Tiger
The common ancestors of jaguars and tigers took different paths. As cats were arriving in South America, others were moving into Asia and developed their characteristic black and orange stripes over time.

The elusive jaguar's territory

Hidden by its camouflage coat, the jaguar inhabits the dense rainforests of the Amazon basin, sticking close to sources of water

Historically, the jaguar was found as far north as southwestern US and as far south as Rio Negro in Argentina, but it now only inhabits about 46 per cent of its historic range. About 90 per cent of the population lives in the Amazon basin, which spreads over Brazil, Bolivia and Paraguay, but the big cat can also be found in remote areas of Central and South America.

This incredible predator uses its habitat to camouflage itself, so it tends to prefer thick, dense rainforest, where it can always find cover and conceal itself. The big cat is always found close to water so flooded forests and swamps suit it well.

According to the IUCN Red List the jaguar's conservation status is Near Threatened, mainly due to habitat loss through deforestation and poaching. They are so elusive that the exact number of jaguars in the wild is unknown; however there are estimated to be about 15,000 left, although numbers are in decline.

"The jaguar tends to prefer thick, dense rainforest, where it can always find cover"

Environmental factors

Humans are the biggest threat to this powerful predator

Habitat loss
Deforestation to make way for agriculture and ranching is destroying the jaguar's habitat. In the Amazon, it is estimated that every minute, a piece of land the size of three football pitches is destroyed.

Human conflict
Because of the loss of habitat, jaguars are increasingly encroaching on local settlements and preying on livestock. The locals kill jaguars through fear and to stop them from feeding on their cattle.

Poaching
Jaguars are also killed illegally for their coats. In the 1960s, 15,000 jaguar skins were sold a year in the Brazilian Amazon. A recovery plan was not put in place to protect the species until 2010.

Competition for food
Another conflict with humans is competition for food. As local people hunt for the same food jaguars need to survive, it makes the search for food increasingly difficult for them.

ABOVE
The jaguar's spotted coat provides excellent camouflage in the jungle undergrowth

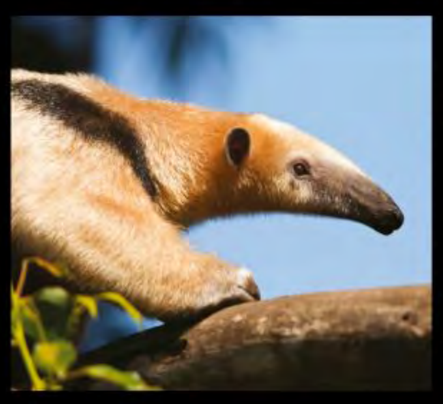
Nearest neighbours

Jaguars share their home with a diverse range of species

Capybara
The capybara is the world's largest rodent. To escape from predators including the jaguar these semi-aquatic mammals will take to the water to hide. Capybaras can swim under water for up to five minutes to protect themselves.

Caiman
There are six different species of caiman, the largest of which is the black caiman. They are closely related to the alligator and crocodile, but their bodies are more narrow. Their only predators are humans and the jaguar.

Tapir
This large herbivore also lives in Central and South America. It uses its short, prehensile snout to browse plants and spends most of its time in the water. This endangered mammal is also hunted by the jaguar.



Giant anteater
The giant anteater has claws that are 10cm (4in) long. It is not aggressive, but can use its claws to defend itself against predators like the jaguar. It feeds on ants and termites using its long, sticky tongue.

In our culture

The fierce jaguar was worshipped and revered by ancient cultures

God of the Underworld
In Mayan mythology, the jaguar was seen as the God of the Underworld, representing power and darkness. The Aztecs, Mayans and Incas all built temples in honour of the jaguar.

Symbol of desire
The jaguar has also been associated with the Roman god Bacchus, who is often seen depicted with the big cat. Both represent the will to express one's innermost desires.

Status and power
This powerful big cat represents strength, confidence and ability, which is why top performance car manufacturers, Jaguar, used the animal for their logo.

MYSTERIES OF THE PANTHER

Stealthier and more successful hunters, the black cats of the world have reaped benefits from a genetic mutation

Silently stalking prey in the dead of night, black panthers are among the most fearsome felines on Earth, with some of the strongest bites of all time. Their silky black fur is a result of melanism – a genetic condition creating the opposite of an albino animal. Unlike living without pigment, a panther's dark fur doesn't make it more recognisable. In fact, studies have shown that black panthers are better at sneaking up on prey, and some monkeys will ignore a big cat without its characteristic markings.

With canine teeth measuring seven centimetres (three inches), this black beauty is the ultimate hunter of tropical jungles and will stop at nothing to kill. Panthers can swim, climb, pounce and bite to bring down prey, and hunt alone. Black panthers live in Africa and South America, where they are dark-furred forms of leopards and jaguars respectively. Their common ancestor moved from Africa across the Atlantic around 10 million years ago, and found a jungle full of monkeys to chase in South America.

The black fur of the panther (here, a black leopard) has given it a sizeable hunting advantage

What is a panther?

The term, 'black panther' does not refer to any one species of animal, and in different parts of the world, black panthers are different animals entirely

The word ‘panther’ can be used to describe any of the four largest species in the Panthera genus - a closely related group of animals otherwise known as the big cats, which includes (in descending order of size), tigers, lions, leopards, and jaguars. Of these, only leopards and jaguars are known to have a black (or ‘melanistic’) colour variant, and both are commonly referred to as ‘black panthers’. There are reports of pseudo-melanistic lions and tigers, with abnormally dark colouring, but they are incredibly rare, and are usually a combination of black, grey, and brown. True black panthers of these species have never been scientifically documented.

Leopard
Panthera pardus
The gene responsible for melanism in leopards is recessive, meaning that an individual requires two faulty copies in order to have black fur. The trait is uncommon in brightly lit areas and the majority of leopards living in Africa and Asia are the classic tawny fur colour, with black rosettes and spots.

Jaguar
Panthera onca
Black jaguars have a different mutation to black leopards, and the trait is dominantly inherited; only one copy of the gene is required for a jaguar to be born with black fur. These animals have a fault in the gene involved in the production of the dark pigment, melanin, majorly increasing the amount deposited in each hair as it grows.

Florida panther
Puma concolor
In some parts of the world cats known as ‘panthers’ aren’t in fact members of the Panthera genus. A North American rare subspecies of cougar called the Florida panther is brown and grey. A black variant is rumoured, but not confirmed.

Why are panthers black?

A genetic mutation known as melanism gives big cats in the wild the advantage

Leopards are ambush predators, and use their spotted camouflage to hide in dappled shade, but in some parts of the world, their fur is almost pitch black. If you look closely, you can still see their spotted markings, but a genetic mutation increases the amount of pigment in their hairs, allowing these rare cats to blend effortlessly with the dark shadows of the forest.

This black variant is known as melanism, and is the result of a single genetic mutation. The colour of leopard fur is controlled by two genes involved in the production of pigments known as melanins. One gene switches on production of dark coloured eumelanin, and the other switches on the production of reddish pheomelanin. In black leopards, the gene that turns on the production of pheomelanin is damaged, permanently turning production of reddish pigments 'off', and tipping melanin production over to the darker eumelanin, resulting in fur that is almost completely black. The dark pigment is also deposited in the iris, giving black leopards their characteristic amber-coloured eyes.

Melanism is not unique to leopards; 11 species of wild cats are known to have this pigment abnormality in their populations, and unconfirmed sightings have been reported for a further nine. The trait is thought to have evolved at least five times separate times in wild cats; an indication that it might give the animals some advantage in their natural habitat. Many other species also have melanistic variants, from domestic cats, to squirrels, snakes, and moths.

Thanks to their amazing colouration, black leopards have been popular in captivity, and have been bred for their beautiful coats. This has lead to health and fertility problems, and also a change in temperament, leading some leopard mothers to abandon their aggressive melanistic cubs in captivity. However, in the wild, this natural genetic abnormality has proved a significant survival advantage in some areas, and in some isolated pockets of the population, particularly in parts of Asia, melanistic leopards are have become common than their light-coloured counterparts.

"In some isolated pockets of the population, melanistic leopards are now more common than their light-coloured counterparts"

These baby panthers are leopard cubs who have inherited the gene for melanism - their markings remain visible despite their dark fur

Habitat range

From a common ancestor 10 million years ago, leopards and jaguars are now spread across continents. Early jaguars may have crossed the Atlantic by accident.

- *Black leopard*
- *Black jaguar*

Europe

North America

Central America
Black jaguars roam in fragmented areas of Central America and are even spotted as far north as California, New Mexico and Arizona. Once common in these areas, the range of the jaguar has shrunk to half its former size, but sightings still occur in the USA today.

Ethiopian Highlands
In mountains of central and northern Ethiopia, up to 1 in 5 leopards are black. The environment is dense forest, and dark colours may help the big cats to blend in to their surroundings.

Africa

Habitat adaptability
Jaguars live in an area of 8.7 million square kilometres (3.4 million square miles), from the swamps of the rainforest to dry desert plains. Doing well in water, up trees and dusty open areas helps jaguars cover such a vast patch of land and makes it one of the continent's best predators.

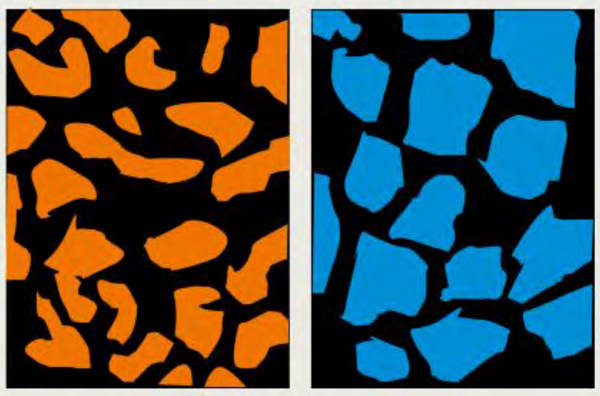
Aberdare Range, Kenya
Black leopards are rare in most parts of Kenya, but higher numbers can be found in the mountains. It is possible that there is a thermal advantage to having a black coat at high altitudes, allowing the leopards to absorb more heat from the Sun.

South America

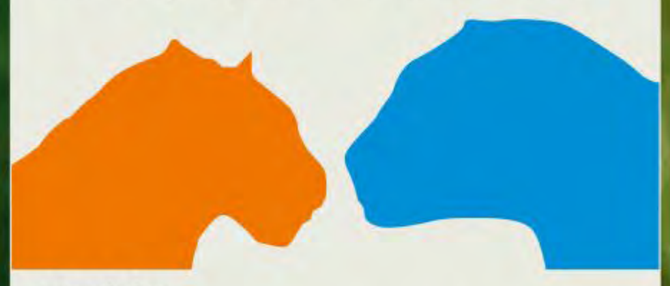
Jaguars need jungle
The largest population of jaguars is in Amazonian Brazil and no further as the cat needs jungle cover. It once roamed as far south as Argentina, but as humans populations rose the largest cat in the Americas began to retreat between the trees.

Jaguar Vs leopard

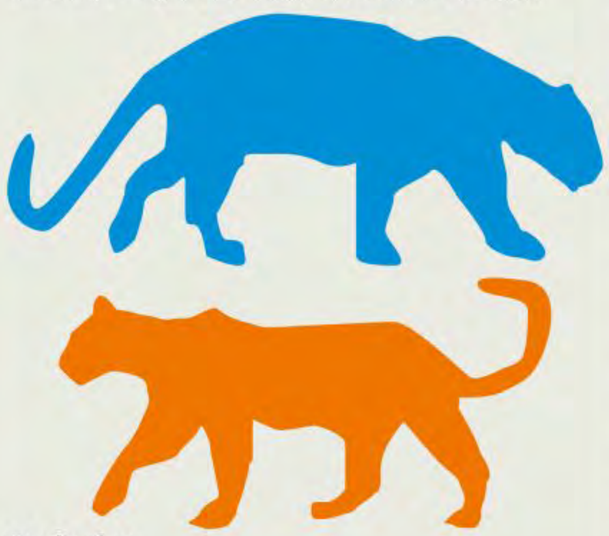
Subtleties that separate jaguars and leopards



Spot size
Leopard spots are arranged into tight rosettes on their back and sides, with plain spots on their heads, tails and legs. Jaguars have much larger rosettes.



Head size
Leopards kill their prey by crushing the windpipe, but jaguars kill by crushing the skull. As a result their heads are larger, and their jaw muscles stronger.



Body size
Jaguars are stocky and muscular, with an obvious curve to their back. Leopards are the smallest of the big cats, and are much leaner, with long bodies, and relatively short legs.

The advantages of melanism

Melanism in wild cats is relatively common, and is thought to have evolved on at least five separate occasions, suggesting that this genetic mutation gives these stealthy predators an advantage in the wild. Hunting leopards rely on camouflage to remain hidden, and fur colour can have a major influence on their success. In drier areas, leopards tend to be light in colour. In snow, their fur can be greyish, and in dark tropical forests, black leopards are more common.

However, camouflage is not the only advantage of melanism. Genetic abnormalities that affect coat colour can have some unusual effects elsewhere in the body, and there is evidence that melanism in leopards might have a protective effect on the immune system. Receptors involved in melanin production also play a role in the entry of dangerous viruses into cells, and animals with the black colour variant may have some protection against disease.

Southern India
The Indian leopard is most often spotted, but coat colour varies throughout its range, and in drier areas, fur tends to be lighter. There are melanistic leopards in southern India, but they are rare, and tend to stay in tropical forests.

Malay peninsula
A recent camera trap study in the forests at the tip of the Malaysian peninsula revealed that every leopard in the area is melanistic, and the local people, the Orang Asli, have reportedly never seen a spotted leopard, despite knowing every animal in the forest.

Melanism in other animals

Black rat snake
Elaphe obsoleta obsoleta
Melanism occurs in several species of snake. Reptiles are cold blooded, and dark skin can decrease the time it takes them to get to the right temperature. However, it does make them more obvious than their camouflaged companions, and whether it has any appreciable advantage in the wild is debated.

Black wolf
Canis lupus
Black wolves are a melanistic colour variant of North American grey wolves. It is thought that the gene for black fur may have entered the wild population due to inbreeding with domestic dogs, but the dark colour seems to be allowing wolves to survive better due to improved camouflage in forest environments.

Black squirrel
Sciurus carolinensis
Some grey squirrels have a mutation that means that instead of producing normal hairs (with a combination of grey, brown and white stripes), the hairs that cover their bodies are pure black in colour. Squirrels that have one copy of this gene are brown-black in colour, and animals with two copies are black.

"This genetic mutation actually gives these stealthy predators an advantage in the wild"

All About Cheetahs

A marvel of natural engineering, this predator races across the African plains at up to 70 miles per hour, pursuing and catching nearly anything in its sights

Inside a cheetah

Cheetahs are built for short bursts of speed. When pursuing prey, the cats can go from standing still to 64 kilometres (40 miles) per hour in just three strides, reaching a top speed of 97 kilometres (60 miles) per hour in three seconds

CHEETAH
Acinonyx jubatus
Class Mammalia

Territory Africa and the Middle East
Diet Carnivore
Lifespan 10-12 years
Adult weight 35-65kg / 77-143lbs
Conservation status

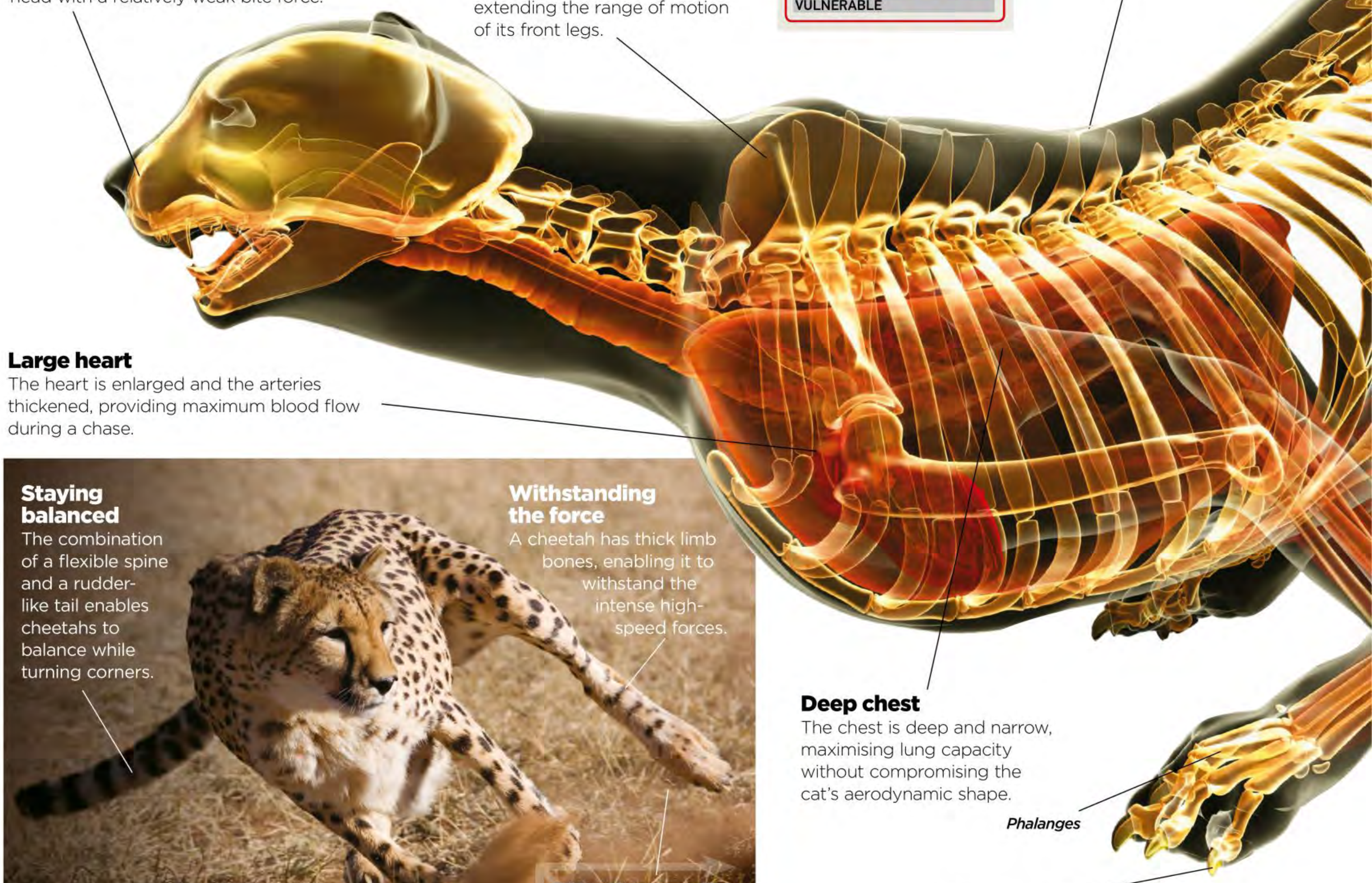
EX EW CR EN VU NT LC

VULNERABLE

Streamlined shape
The cheetah trades jaw strength for aerodynamics and has a small, flat head with a relatively weak bite force.

Free-floating shoulders
The shoulder blades aren't fixed to the rest of the skeleton and instead float freely, extending the range of motion of its front legs.

Flexible skeleton
The spine is long and flexible, while the pelvis enables an extended range of motion, meaning the cheetah can spring forward as it runs.



Large heart
The heart is enlarged and the arteries thickened, providing maximum blood flow during a chase.

Staying balanced
The combination of a flexible spine and a rudder-like tail enables cheetahs to balance while turning corners.

Withstanding the force
A cheetah has thick limb bones, enabling it to withstand the intense high-speed forces.

Maintaining traction
The footpads of a cheetah are hard and their claws act like crampons to grip the ground.

Effective gravity
Gravity and centripetal force affect a cheetah as it turns, increasing its effective weight by up to 66 per cent.

Deep chest
The chest is deep and narrow, maximising lung capacity without compromising the cat's aerodynamic shape.

Phalanges

Exposed claws
Unlike other cats, the cheetah's claws don't fully retract and are permanently exposed. They provide grip when turning, but are blunted by constant friction on the ground.

TURN RADIUS

Radii required for a 180-degree turn at different speeds

93km/h turn radius = 52m

58km/h: Turn radius = 20m

14km/h: Turn radius = 1m

INFANCY → JUVENILE

Newborn cubs *1 day*
Cheetah cubs are born in litters of two to five and weigh between 150 and 300 grams (5 and 11 ounces).

Eyes open *1 week*
For the first week cubs are blind and rely entirely on their mother to keep them hidden in the long grass.

Teething *3 weeks*
Teeth begin to appear after three weeks, but the cubs remain vulnerable, with the mother moving them to new den sites.

Starting to explore *6 weeks*
After six weeks the cubs are ready to leave the safety of the den – they watch and play while their mother hunts.

Long tail

Imperative for balance, their tails consist of around 18-20 bones (caudal vertebrae) and are an extension of their spine. The tail helps cheetahs when running, as they use them to help steer and change direction, like the rudder of a boat.

Tears

The black markings that run from the corners of a cheetah's eyes to its mouth absorb light. They're thought to block the glare from the Sun, aiding in daytime hunting.

Vocalisation

Unlike the big cats of the Panthera genus, including lions and tigers, the cheetah cannot roar. It does, however, purr like a domestic cat.

Camouflage

A cheetah has between 2,000 and 3,000 solid black oval or round spots, which break up its silhouette in the grass.

Breathing in step

Ferocious sprinters, cheetahs can only breath in step with their stride. To help with speed, their deep chest and large nostrils, heart and lungs help them breathe in more oxygen during intense chases.

Closest family

Closely related to the cheetah are...

Cougar
Like the cheetah, the cougar uses its incredible agility to pursue and catch prey. This adaptable cat can be found throughout the Americas, but despite its size it's not classed alongside lions and tigers as a big cat, because it isn't able to roar.

Jaguarundi
With a flattened head, rounded ears and a tail just like an otter's, this small South-American wildcat seems more likely to be related to a weasel than a cheetah. However, jaguarundi are actually one of the cheetah's closest living relatives.

Lynx
More distantly related to the cheetah is the lynx or bobcat. It too is an ambush predator, preferring to use short bursts of speed rather than extended levels of stamina. This cat is far stockier, however, and favours smaller prey such as rabbits and hares.

MATURITY

Learning to hunt *7 months*
The female catches and releases her prey, enabling her cubs to hone their hunting skills before they enter maturity.

Leaving home *18 months*
Female cubs sometimes leave their mother before they're sexually mature, remaining together in a sibling group.

Sexual maturity *2 years*
When female cheetahs eventually mature, they leave their sibling groups. They will now begin a solitary life raising a family of cubs of their own.

Coalition life *2 years*
Male cheetahs spend most of their adult lives within co-operative groups, most often travelling as pairs of brothers.

The next generation *3 years*
Female cheetahs will mate all year round, providing there is adequate food, and produce a litter around once every 18 months.

How a cheetah hunts

Formidable sprinters and epic predators, the cheetahs are at the top of their hunting game

Cheetahs are frequent hunters and with an average kill rate of 50 per cent, they are rivalled only by wild dogs as Africa's most successful predators. Their preferred prey animals are medium-sized antelope, ideally weighing less than 40 kilograms (88 pounds), equivalent to a large domestic dog.

Unlike other hunters, cheetahs don't selectively prey on weaker animals and the majority of their prey are healthy animals. Their hunting tactics focus on isolated members of a group, avoiding the danger of targeting an entire herd. Cheetahs use stealth to hunt their prey, approaching from behind to avoid detection and often remaining hidden in grass or brush.

Cheetahs are incredibly quick, but tire rapidly and can only sustain a sprint for around 300 metres (984 feet) before their bodies begin to overheat. When a cheetah runs, its heart rate climbs from 60 to 150 beats per minute and after a chase it takes 30 minutes to recover.

The chase is intense and usually over in just 20 seconds. The cats' streamlined heads only contain small jaws and their bite force is low, so in order to immobilise the prey they must get underneath the throat to compress the trachea. When the cheetah catches up with its target, it swipes at the hindquarters, sometimes using its sharp dewclaw as a grappling hook, knocking the animal off balance before pinning it to the floor.

Catching a meal is only half of the battle and although a cheetah can hold its own against small scavengers like jackals and vultures, over half of all kills are stolen by packs of hyena and prides of lions. As a result cheetahs eat quickly and a team of four males can devour an antelope in under 15 minutes.

01 Stalk

The cheetah approaches from behind, using cover to remain hidden until it's just 30m (98ft) from its target. The animal's spots break up the its silhouette, concealing its looming presence from the prey.

02 Chase

It selects an isolated victim, away from the danger of the main herd, and suddenly begins the assault. It accelerates to a top speed of 113km/h (70mph), chasing down its target over hundreds of metres.

"With an average kill rate of 50 per cent, they are rivalled only by wild dogs as Africa's most successful predators"

03 Takedown

When the cheetah catches up with its victim, it uses a front paw to swipe at the back legs, knocking the animal to the floor. At such high speeds, even the slightest contact can spell disaster for the prey.

04 Feast

Once the target is grounded, the cheetah uses a stranglehold to suffocate it. Because the cheetah has a weak bite, it twists beneath the prey's throat and clamps down on its windpipe.

Life in cheetah society

Males can form fearless clans while females fight alone

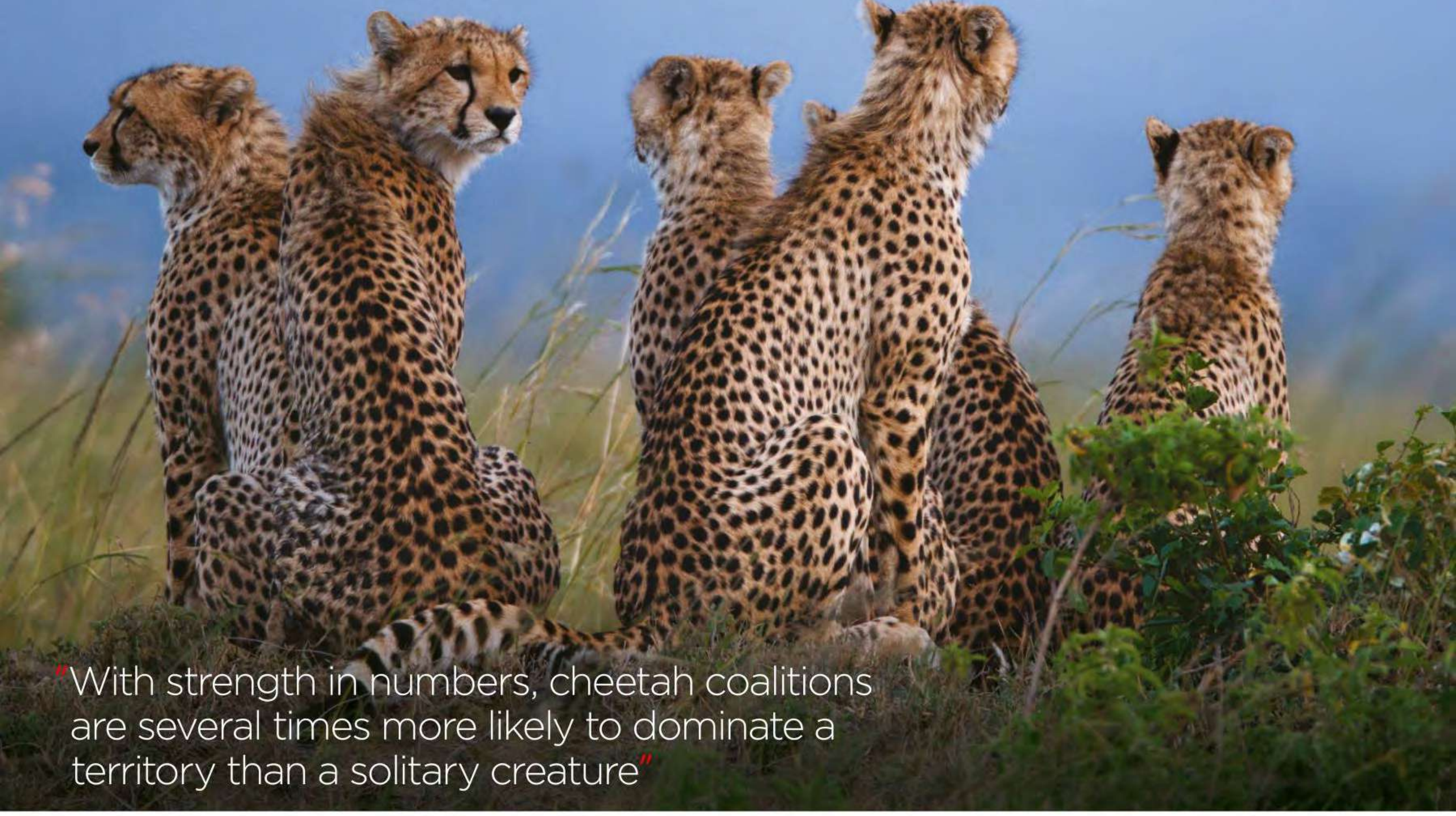
Unique to cats, the social structure of cheetahs varies between the sexes and revolves around diet and feeding habits. While females prefer a solitary life, males can form social groups, known as coalitions. This will often be a group of brothers from the same litter and the bond will be for life. If there was only one male in the litter, several solitary males may form their own group, or individuals will join existing ones.

With strength in numbers, cheetah coalitions are several times more likely to dominate a territory than a solitary creature. Fiercely territorial, males will mark their patch by urinating on trees, logs, termite mounds and will fight to the death to maintain their stronghold. Having control over their territory makes for a greater chance of breeding with the females that roam within this territory.

Funnily, there's little evidence of a hierarchy within these coalitions. Instead, males within the group seem to have adopted co-operative relationships with little aggression between one another, except when harmless squabbles occur at feeding time, and occasionally when mating is involved.

Females can drift further afield than a designated territory, meaning their home ranges are larger and practically impossible to defend. A home range depends on the prey available and the benefits of solitary living, including the ability to follow the migratory pattern of their prey.

Females' ranges can often overlap with others belonging to their sisters, mothers or daughters. They will hunt, eat and live alone unless accompanied by cubs and they'd sooner avoid confrontation than fight.

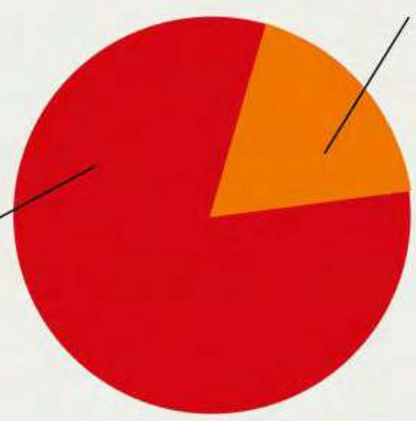


"With strength in numbers, cheetah coalitions are several times more likely to dominate a territory than a solitary creature"

Diet and feeding

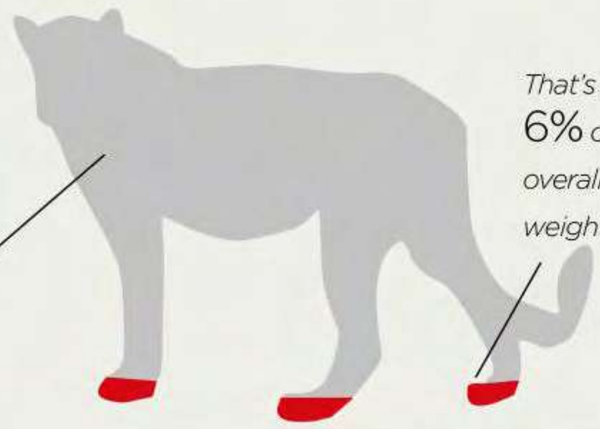
Cheetahs are prolific, agile hunters with a preference for antelope

80% of their diet consists of ungulates (including gazelle, impala, antelope)



Occasionally they supplement their diet with birds and hares

An average male cheetah eats 4kg/8.8lbs *of food per day*



That's over 6% *of its overall body weight*

How a mother protects

Female cheetahs are fertile periodically throughout the year and cubs are born during all seasons. In the days leading up to oestrous, when female cheetahs are receptive to mating, the chemical make-up of their urine changes and scent markers alert nearby males of the opportunity to mate. Males track these females, paying careful attention to their scent trail, as well as to visual signals before making a move. If the female doesn't fall pregnant, the cycle repeats again in around ten days.

The likelihood of success is greatly increased when prey animals are abundant, so cheetah birth rates often follow the breeding patterns of local populations of antelope. If mating is successful, the female will give birth to a litter of between two and five cubs after three months. The cubs are born blind and are unable to walk for the first three weeks, so the female chooses a secluded location, often in grass, beneath rocks, or even in abandoned turtle burrows.

Cubs are entirely reliant on their mother for nutrition and protection, so she must make a successful kill every day in order to sustain them. Nursing females prefer to hunt smaller, easier animals such as fawns and hares, ensuring a consistent supply of milk.

Cheetah cubs aren't well camouflaged when they're born and can be seen from a great distance, so the mother goes to great lengths to conceal them, periodically moving the den site to minimise scent tracking. She uses vantage points, such as termite mounds, to scan the environment for predators, as well as to keep an eye out for an easy meal.

Despite the efforts of the mother, as many as nine out of ten cheetah cubs don't reach adulthood. They're not good at identifying danger and have a tendency to scatter when threatened, making it difficult for the mother to defend them all at once. Large pack hunters, such as hyenas and lions, pose a major threat to cheetah cubs.

ABOVE Cheetah cubs are often vulnerable, so need protection from their mothers

Trained to hunt

Cub development takes around 15 months, during which time the young cheetahs must learn to hunt. They spend a large amount of time at play, practising techniques like stalking, pouncing, swatting and wrestling.

Cubs begin their training at four months, when the female starts to bring live prey back to practise on, allowing the cubs time to play before completing the kill herself. She also allows the cubs to join the chase, slowing down to let them overtake and have a chance at tackling the target. After ten months, cubs are killing around half of their own food, mostly birds and hares, and by 15 months they are competent enough to survive on their own.

Maternal guidance
Before the cubs join in the hunt, the female cheetah provides them with small or weakened prey to practise on.

Small prey
Cheetah cubs are inexperienced and begin by hunting small animals like birds, hares and fawns.

Stranglehold
This death-grip is a vital part of the cheetah hunting strategy and cubs begin to practise early, starting out by biting one another's necks.

The habitat of the cheetah

How this graceful cat's diminished range threatens its survival

The historical range of the cheetah once extended across Africa, through the Middle East and central Asia, all the way across to India. In 1900 an estimated 100,000 of these agile predators roamed across these regions. Cheetahs were once sought after for their hunting prowess, used by royalty and nobility in place of greyhounds. Extensive poaching of wild populations also drove the cats' numbers down.

In central Asia the cheetah is now extinct and in the Middle East just 100 individuals remain in Iran. The remaining population of around 7,500 is scattered across Africa.

Despite the decline in cheetah numbers, they're surprisingly adaptable and can be found in a range of habitats. They require a balance of cover and visibility in order to hunt, so avoid thick undergrowth, dense forest and tall grass.

Human expansion across Africa has limited the range of the remaining cheetah population and in many areas cheetahs clash with human settlements. Protected areas, such as national parks and nature reserves, provide some protection from poaching and human conflict, but tend to have higher numbers of dangerous predators such as lions, who not only compete for food, but also put cheetah cubs at risk.

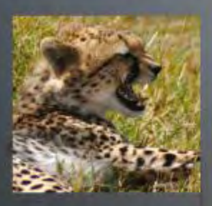
There is still a relatively high demand for cheetahs as pets and cubs are regularly taken from the wild. Smuggled exotic animals are often transported in poor conditions and only one in six stolen cubs survives the journey.

"Despite the decline in cheetah numbers, they are a surprisingly adaptable species, and can be found in a range of habitats"

On lookout
Termite mounds and banks are ideal spots for surveying the landscape for dangers.

Environmental factors

Cheetahs are threatened by both natural and man-made environmental pressures



Habitat loss
Human expansion across Africa and the Middle East has fragmented the cheetah habitat, limiting the supply of prey animals and driving cheetahs into smaller and smaller areas.

Human conflict
Local farmers see cheetahs as a danger and a nuisance. The cats are blamed for devastation of livestock, despite the fact that other predators are more often responsible.

Inbreeding
The population was severely dented in a mass extinction event 12,000 years ago. Only a few individuals survived, so the current population is very inbred, resulting in genetic disease.

Predation and competition
Cheetahs may be fast, but they aren't strong and many cubs are lost to attacks by lions and hyenas. Those that do survive face fierce competition for food from the same animals.

Cheetahs and humans

Humans and cheetahs have a relationship dating back thousands of years. The earliest known images of the cats can be seen in the Air Mountains in Niger, which are over 7,000 years old. It's thought early humans were interacting with the animals much earlier, maybe even stealing their food.

Cheetahs have been kept in captivity for at least 5,000 years, and were sought after as pets of the Ancient Egyptians. More recently they have also been used in place of dogs for hunting. Like greyhounds, cheetahs are fast and rely on sight – as opposed to scent – to track their prey. They can also be used in a form of sport hunting known as coursing. Cheetahs don't breed well in captivity, so the hunting animals were regularly taken from the wild, before being tamed and taught to course.

The practise of hunting with cheetahs was popular in north Africa, the Middle East and central Asia. A cheetah was even presented to King George III, but disappointed the monarch when it failed to bring down a 100-kilogram (220-pound) red stag.

Keeping cool
Cheetahs spend most of their time resting in order to avoid overheating.

In our culture

The speed and hunting prowess of the cheetah has inspired many fictional characters

Cheetara
Just like a cheetah, female ThunderCat Cheetara can run at high speeds, but tires quickly. She also has a sixth sense, enabling her to detect nearby dangers.

Barbara Ann Minerva
DC villain, the Cheetah, is the result of a failed tribal ritual, when British archaeologist Dr Barbara Ann Minerva attempted to obtain the powers of an African cheetah.

Chester Cheetah
The Cheetos brand mascot is one of the best-known cheetahs in popular culture. He was introduced in the 1980s and replaced the less well-remembered Cheetos mouse.

Duma
This 2005 film depicts the story of an orphaned cheetah cub, Duma, and a bullied schoolboy, Xan, who runs away into the mountains of South Africa with the cat.

Nearest neighbours

Cheetahs might be powerful hunters, but they are vulnerable to other predators

Lion
The second largest living cat is a formidable enemy. When faced with a lion, there's little that a cheetah can do. Lionesses are powerful hunters, and work as a team to take down their prey.

Spotted hyena
Hyenas are related to cats, but behave more like dogs, using their teeth rather than their claws to tackle prey. Opportunists and scavengers, they'll not only steal prey from cheetahs, but are also a threat to their cubs.

Leopard
Leopards may look similar to cheetahs, but these stockier big cats are more closely related to lions and tigers. Leopard spots aren't solid, like a cheetah's, instead forming distinctive rosettes.

Black-backed jackal
Relatives of the wolf, these opportunistic animals are omnivores and live mainly on a diet of small prey and scavenged carcasses. They are aggressive, feisty and will often tackle much larger animals.

DOUBLE LIFE OF THE COUGAR

Built to withstand the unpredictable wilderness of the desert mountains, cougars make easy work of picking out urban prey

The mountain forests, sheltered swamps and vast desert planes of North America are dominated by the ultimate wild cat. The cougar – also known as the mountain lion – is the most widespread native mammal in the entire Western Hemisphere and can survive in almost any environment. This tenacity has led the continent's largest cat down from the hillsides to bustling cities to take advantage of the available prey and human leftovers.

Sightings of urban cougars are steadily increasing. After spending their days at rest in remote rural areas, they descend the slopes toward the town. Predators will always sniff out the areas with the most prey, and urban areas are bursting with coyotes, rodents and raccoons. Cougars prowl through the night on the hunt, able to evade any obstacle that gets between them and their prey.

From day to night

Prowling into towns on the hunt for food, the cougar will go to any lengths to survive

Up in the mountains

The secluded hillsides shelter the mighty cougar from prying eyes during daylight hours. This is the cougar's time to rest and raise their families. Though usually solitary, cougars pair up to mate and cubs stay with their mothers for two years. Newborn kittens are sheltered in a den, but as they grow they become more and more independent. This idyllic landscape is the ideal place to raise a cougar family where the cubs are safe, and as they live at altitudes of up to 5,800 metres (19,000 feet), there is little danger from predators.

Agility
With the longest legs in proportion to their body of any other cat, cougars can jump more than 5m (18ft) in the air from standing. A horizontal jump can cover a distance of up to 12m (40ft).

Camouflage
These cats are almost invisible against the backdrop of mountain rocks and tall grasses.

Terrain
The jagged peaks and extreme conditions in the mountains act as training grounds for growing cats. Cougars sharpen their endurance skills on a daily basis and only the fittest cats survive.

Rest
Active at dawn and dusk, cougars rest during for 30 to 55 per cent of the day. For safety, lone adult cougars choose to rest in trees or hidden high in the hills where they are unlikely to be disturbed.

Kittens
Speckled cougar kittens blend into the environment perfectly, but lose their spots as they get older. Their mother teaches them to hunt before they leave her side to fend for themselves.

NORTH AMERICAN COUGAR
Puma concolor
Class Mammalia

Territory North and South America
Diet Deer, raccoons, porcupines
Lifespan Up to 13 years
Adult weight 60kg (130lb)
Conservation Status

EX EW CR EN VU NT **LC**

LEAST CONCERN

Cat about town

When the sun sets cougars can make their way toward human settlements that are riddled with prey. Nocturnal mammals that feast on the remains left by humans occupy a niche without natural predators, and cougars have started to take advantage of that food source. Reports of cougar sightings from homes are increasing, and these once-elusive cats are becoming regular visitors to urban areas.

Equipped with the tools to survive the wind-battered cliffs and arid deserts, cougars are able to take the streets in their stride while the city slumbers. By dawn, cougars are able to make their way back to the wilderness.

Night vision
A cougar's pupil can open three times wider than a human pupil, letting in three times the amount of light. This helps a cougar keep its eyes on its prey in low-light conditions.

In and out
Rather than spending the entire night in an urban area, cougars make short visits in and out of cities to stay safe from humans.

Boys in the hood
Though usually solitary animals, orphaned cougars that have not been able to learn how to hunt from their mother often team up to hunt in urban areas.

Speed
Cougars are able to run in bursts of speed up to 80km/h (50mph), which helps these cats catch nimble deer.

Hunting
Like many cats, cougars stalk their prey before striking. A cougar can spend over an hour following a single animal to capture, before sinking its teeth into the back of the prey's neck.

"When young cats reach maturity they must find territory of their own. It's called dispersal, and it's often the reason why cats end up in towns looking for food or shelter"

Why the cat's in the city: an expert opinion

Penny Maldonado is an ambassador for nature. Managing a fund led by a board of directors that includes founder Thomas Mangelsen and Dr Jane Goodall, her work focuses on cougar research and education to help conserve the big cats of North America

Name: Penny Maldonado
Role: Managing director of the Cougar Fund
Website: www.cougarfund.org

What would you say is the cougar's role in the ecosystem?
They are apex predators, which means they are at the top of the food chain. Other large carnivores like grizzly bears are omnivorous, but cougars can only eat meat. What they leave as carrion helps support other species like rodents and coyotes, which dine on what's left. Even when carcasses rot there is improvement in soil quality, so even the smallest invertebrates benefit from cougars.

What would lead a cougar to enter a town or urban area?
It's the drive to survive that leads them to enter unfamiliar territory. When young cats reach maturity they must find territory of their own. It's called dispersal, and it's often the reason cats end up in towns looking for food and shelter. It tends to be more common with orphaned kittens whose mothers have passed away. They are driven to eat but they haven't had the time with the mother to learn how to hunt wild deer effectively on their own.

Young cats will compete for prime territory and the losers end up in inappropriate places. Maybe the quiet area away from the town has a big tomcat living there, so the young male that's just had to leave its mother has to choose which habitat is the greatest danger. If it chooses to challenge the tomcat, it may be killed. That's a real threat; inter-species competition can lead to cougars fighting to the death. The young male might take his chances in the town.

What does an urban area offer to a hungry cougar?
Animals such as raccoons, which have become a fixture in urban areas, are a huge attractant. Cougars are opportunistic and if food like that is available, they will keep coming; they aren't really picky about where their food comes from. They are very efficient hunters, they ambush prey and attack from behind. Cougars are often more efficient killers than, say, a pack of wolves.

Do cougars have the tendency to stay hidden during the day but then enter towns at night?
That's exactly what they do; they pop into town at night. Because they know they are in an area that isn't really that hospitable they tend not to take deer. Dragging a deer away takes a lot of time, plus they have to spend time hiding it from others. So when they go into towns they just take small animals like raccoons, so it's almost as if the cougars realise they can't hang around to hunt the way they normally do. It shows an adaptation on the cougar's part. It's routine, it's their job to survive.

BELOW Cougars have extraordinary leaping ability, and are among the planet's most efficient hunters

EURASIAN LYNX
Lynx lynx
Class Mammalia

Territory Western Europe to central Asia
Diet Deer, rabbits, birds
Lifespan 14-20 years
Adult weight 40kg (88.1lb)
Conservation status

EX EW CR EN VU NT LC

LEAST CONCERN

SUPER SENSES OF WILD CATS

LYNX

The Eurasian lynx is an incredibly capable carnivore. It relies on its super senses to take down the wariest of prey, stalking with ruthless efficiency

Cats are natural-born killers. Even the humblest, most home-loving of domestic moggies, like the one that may share your sofa, will never lose the ability to fend for itself, essentially becoming a feral force-of-nature if turned loose. Even when provided with food by their owners, cats never really quit their predatory ways. In fact, around the turn of the 20th century, one lighthouse keeper's cat, named Tibbles, literally became the first single being to cause the extinction of another species – the Stephen's Island Wren.

As medium and big cat species scale up from our more familiar domestic felines, so do their abilities. There is one medium-sized cat, once native to Britain, which punches above its weight quite considerably and earned its position as a historical apex predator.

The lynx is nature's foremost-evolved deer hunter. To effectively stalk and bring down such easily spooked quarry requires some extreme senses that are just as sharp as their finely-honed claws and teeth, which can deal some serious damage.

TOUCH

Touch is as good as sight thanks to fantastic feelers

If the tufts on its ears aren't its antennae, then the lynx's whiskers surely qualify. These tough hairs aid in building a picture of the animal's surroundings

Lynxes have around 24 conspicuous primary whiskers on each side of their nose, properly known as mystacial (moustache-like) macrovibrissae. Additionally, there are supraorbital (above the eyes), genal (cheek-located) and mandibular (on the jaw) whiskers located around the face. Lynxes, like most cats, also have a carpal whisker on each leg, emerging from just above the wrist joint.

The whiskers located on the lynx's face are moveable and can communicate mood, but their main function is tactile. When a lynx has captured a small animal, such as a rodent or bird, it feels where to deliver the killing bite with its whiskers, as the prey is now beneath the cat's head and out of view. Getting a clean, quick kill is important, especially when the prey has teeth of its own and could potentially inflict damage to the sensitive nose and eyes of the lynx during a desperate battle to escape.

The whiskers also let a prey-focussed lynx know when to blink while pursuing prey through the dense undergrowth. This early-warning system prevents branch or thorn-related injuries to the eyes.

SMELL

A male lynx will leave special scent markers throughout its territory in the hope of attracting a mate

Lynxes send and receive messages with their odours

Lynxes' noses are outwardly small and their incredible sense of smell drives every action

Cats aren't as famous for their ability to sniff things out as their canine counterparts. However, they still rely on scent to make essential decisions like avoiding conflicts and predators, defending territories and finding mates. Lynxes don't track prey by scent, per se, but they will often face the breeze and perform a kind of sneer, drawing air into their mouth and nose simultaneously.

This odd intake of breath is known as flehmen behaviour. As well as drawing smells into the nostrils and the relatively large olfactory bulb organ in the brain, it allows a special apparatus known as the Jacobson, or vomonaseral organ, located in the roof of the mouth, to come into play. Scent molecules and pheromones from other animals landing on this organ transmit a message directly to the cat's amygdala – the section of the brain responsible for unconscious actions such as digestion – and instantly trigger instinctive reactions. A male lynx will often leave messages for others of its kind by scratching and urinating or rubbing its special scent glands on objects in its territory. Males may avoid one another, but females will be able to follow these smelly signposts, using them to locate the most appealing male in the area when they are ready to breed.

SIGHT

A lynx can spot a mouse 250 feet in the distance

A lynx's eyes are ideally arranged for judging distances, dodging hazards and identifying prey

Across the Atlantic Ocean, Native American folk tales tell of bobcats (a related subspecies of the lynx) that could see through darkness, mist and even solid objects such as trees. While the inevitable exaggerations have obviously happened over time, they may be based on genuine observations.

Any healthy lynx, regardless of subspecies, has forward-facing eyes that enable it to judge distances and attack at speeds in almost the same way as birds of prey. This fits well with their habit of hanging out in the densest of trees and literally slipping through the branches onto an unsuspecting deer, using gravity and timing to take it down. Lynxes barely need to blink and when honing in on another animal, they fixate their gaze into a very intense stare. During dash-like pursuits through the dense forests, they appear to plot their path through trees well ahead of time, perhaps fuelling the ancient legends.

Clouded leopard cousins

Generally, wild cats that hunt during the daylight hours have round pupils, whereas smaller, more nocturnally active hunters, such as the domestic cat, have elliptical, slit pupils. One exception is the clouded leopard, with pupils that are neither round or slit, but falling somewhere in-between. A combination of the familiar reflective cat eye (tapetum lucidum), which reflects light inside the eye, accompanied by a larger percentage of rods to cones, giving this low-light hunter a night-vision capability that we can only imagine. It is thought that clouded leopards need less than one-sixth of the light we do to see perfectly.

Clouded leopards have remarkable eyes and can see in night vision

TASTE

Lynxes tend to hunt at night and can spot a mouse from 75m (250ft) away

A lynx's sense of taste drives it to ignore sweet foods

A lynx's sense of taste is closely tied in with its sense of smell. Like all cats, it has an interesting reason for preferring meat

Cats can't perceive sweet tastes and lynxes are no different. Cats lack a protein known as TAS1R2, which is one half of a pair required to produce functioning sweet taste buds. As a result of a deletion mutation (loss of genetic material) in an early cat ancestor, cats still possess the actual taste buds, but they simply don't function. It is widely thought that this led cats of all shapes and sizes to evolve into obligate carnivores – animals only equipped to eat meat.

However, cats can taste adenosine triphosphate (ATP), the chemical that provides energy in every living cell. ATP is found in the highest concentrations inside skeletal muscles. With the aforementioned vomonaseral organ further blurring the already muddled lines between taste and smell, it's possible that cats can taste the quality of protein in a potential victim from the moment they get close enough to attack.

So a lynx's sense of taste will ultimately drive it to ignore sugar-rich plant-based foods, which may contain harmful defensive toxins and even avoid carrion. Instead it hunts living creatures, which by way of being healthy enough to try, are a perfect, exploitable and safe source of food.

HEARING

With incredibly powerful hearing, the lynx can hear animals underground

A lynx's picture of the world around it is partially formed by ears that can revolve like radar-receptors

The characteristic tufts at the top of a lynx's ears are thought to be super-sensitive to vibrations in the air. While these tufts don't appear to be connected to any specialised nerves, they really help to flag just how mobile the lynx's ears are. These cats can swivel their ears independently up to 180 degrees. Interestingly, markings on the ears appear to mimic eyes and, while they don't actually possess eyes in the back of their head, their hearing is so acute that combined with these swivelling sound catchers, sneaking up on a lynx is practically impossible, no matter what direction it's looking in.

Comparable to domestic house cats, lynx hearing is thought to extend from 45 to 64,000 hertz (Hz), which is a seriously wide range when compared to the 20 to 23,000Hz of the average human. Lynxes are capable of picking up ultrasonic sounds that we need special equipment to observe. When the menu includes tiny rodents that communicate using these frequencies, the lynx seems to locate their burrows by listening from above, gathering plenty of useful intelligence for preparing an ambush or direct assault. Lynxes can often be observed with an ear to the ground, listening out for animals scurrying below.

Five felines with super senses

Leptailurus serval
The long ears of the African serval aren't just for show. These super-intelligent stalkers even hunt with their eyes closed, relying entirely on sound to make pinpointed pounces.

Acinonyx jubatus
The cheetah has tiny ears, creating less drag during sprints, but they hear well. In fact, there's evidence that cheetahs listen for rivals at distance, to decide if a chase is worth it.

Leopardus wiedii
The margay is a small South American cat that can hunt entirely in trees. This feline gymnast has been observed mimicking baby pied-tamarin monkey alarm calls to ambush them.

Felis bieti
The Chinese mountain cat is a rarely seen nocturnal inhabitant of the Mongolian steppes. Here it lives in burrows and mainly feeds on mole rats and pikas.

Caracal caracal
The caracal looks like a lynx, but has more in common with the serval. There's no evidence for those tufts acting as antennae, but they appear to aid an ability to hone in on sound.

African Wildlife

The African continent is home to some of the most amazing and mystifying animals, from the rugged rhino to the fabulous flamingo

African Wildlife

132

104

© ThinkStock; Dreamstime

AFRICAN SAFARI

JOURNEY TO KENYA FOR A WILDLIFE ADVENTURE

Whether it's witnessing the great Masai Mara migration, taking a hot air balloon tour or coming face to face with wildlife, Kenya offers an experience for every traveller

Travel expert

Jarrod Kyte from Steppes Travel gives his insight as to why you should experience a trip to Kenya

Picture Africa in your mind's eye and chances are you will visualise the vast, acacia-dotted plains of the Masai Mara. It is a land so quintessentially African that you have to remind yourself it is real and not just a film set or an elaborate computer-generated image. The world's greatest natural spectacle – the wildebeest migration – is Kenya's must-see attraction, but it is no one trick pony. The majestic backdrop of Mount Kenya makes the Laikipia plateau a spectacular place for a safari while Samburu's dramatic landscape, distinct wildlife and charismatic people are not to be missed. Top all this off with a week on the coast and you have a winning holiday!

Best safari spots

Hippo
Although said to be dangerous, hippos are mostly aggressive towards the end of the dry season in October. This is when males fight over space as water levels have decreased in the absence of rain.

Chimpanzee
The only chimps in Kenya live in a 250-acre rescue centre at the Ol Pejeta Conservancy. The sanctuary is open between 10am and 4.30pm.

Elephant
Around 35,000 elephants live in Kenya and over one third of them can be found in Tsavo National Park. Groups are seen by watering holes, and tour operators will know the best areas to search.

Lion
These big cats are most abundant in areas full of prey species such as zebras and gazelles. Remember that lions spend most of their time at rest rather than hunting.

Leopard
Though off the beaten track, Samburu is the best place in Kenya to see leopards. Sightings are never guaranteed, but the bravest travellers can camp out in big cat country to improve their chances.

What you need to know

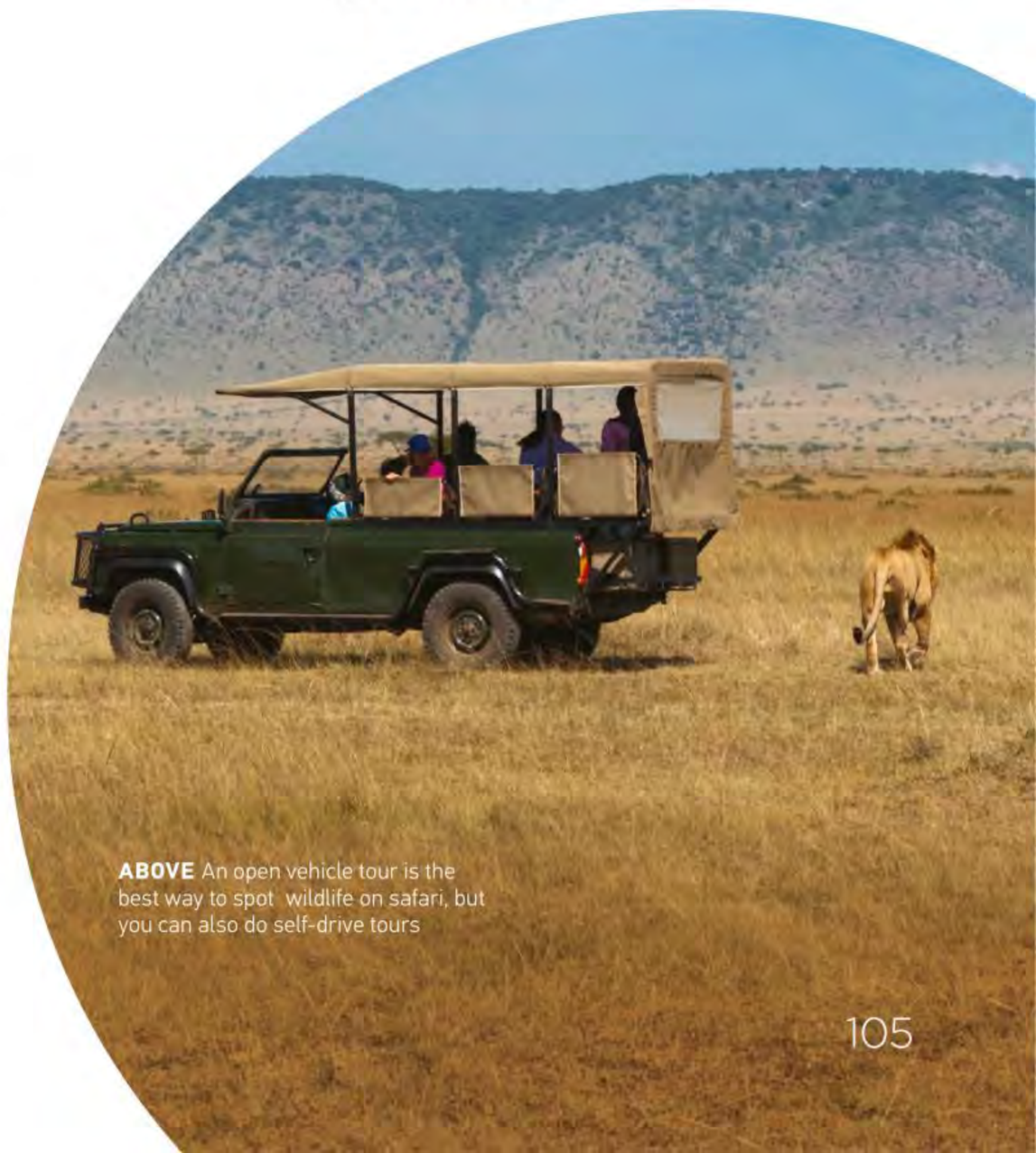
When to go
The dry season is the ideal time to visit Kenya, from June to October. These are the peak months for wildlife sightings.

How to get there
Fly from a huge range of starting points to Jomo Kenyatta International Airport in Nairobi. Once there, you can hire a car or arrange a transfer with your tour company.

Weather conditions
The maximum temperatures in the dry season (June to October) are up to 30 degrees Celsius (86 degrees Fahrenheit). Rain is still possible in the dry season, but it peaks in April and May.

What to take
Sun cream and insect repellents are a must, along with light, neutral-coloured clothes and layers for the cool mornings and evenings. Don't forget your camera to capture every moment.

What you'll see
Wildlife is unpredictable, but safari guides know what they are doing. Visit a conservancy like Ol Pejeta to see animals under protection of humans.



ABOVE An open vehicle tour is the best way to spot wildlife on safari, but you can also do self-drive tours

Flamingos congregate in thousands

Three quarters of the world's lesser flamingos live and breed in east Africa. They rely on tranquil lakes that are far enough away from predators to keep their young safe. They are nomadic birds that wander the alkaline soda lakes of Kenya and Tanzania. Lesser flamingos breed in enormous numbers, but their reproduction is heavily reliant on rainfall. Extreme high and low water levels are often associated with predator attacks and low availability of food. In these times flamingos breed in low numbers, or not at all. Optimum levels leave salt islands exposed ready for the birds to build their nests, but this could all change. Plans to build industrial plants to extract soda ash from the water could cause lesser flamingo numbers to plummet. Visitors to Kenya help battle these types of development as they bring in money during their stay.

Wildebeest fling themselves into the river

In early summer wildebeest and zebras begin to approach the Mara river in the hope of getting across safely. More than a million animals make this journey through the crocodile-infested water, and most survive. The dangers are many, however. Not only must the wildebeest evade the snapping jaws of crocodiles, but big cats like lions are known to lie in wait in vegetation to pounce on passing prey.

This is the ultimate Kenyan safari spectacle, though watching crossings takes patience. It's a good idea to stake the Mara out for a decent length of time. That way you have a better chance of seeing some action, including a rare daytime big cat kill.

While pictures of the great migration are amazing, experts say that the smell and sound of the event are the lasting memories. Those lucky enough to witness a crossing won't forget it in a hurry.

More than wildlife

Diani Beach
Visit the tranquil, white sand beach on the edge of the Indian Ocean. It's rarely crowded, and makes a fantastic change from the dry savannah planes.

Village visits
Meet local people and learn about their trades and traditions by taking a trip to a Kenyan village. These visits can usually be arranged by your safari operator.

Scuba diving
Take to the sea to beat the African heat, and experience what underwater life is really like. Lucky divers will see turtles, dolphins and even humpback whales.

White water rafting
For adrenaline seekers, Kenya is a great place to get involved with water sports. Try white water rafting along the Ewaso N'giro and Tana rivers, where the scenery is fantastic.

Archeology and history
Fossils found in Kenya date back 100 million years, and the country is a hub of human evolution research. Gedi National Monument and Koobi Fora are fascinating historical sites.

Meet the Big Five

This term was originally used by hunters, but now refers to the animals of Africa that have to be seen to be believed

Go on rhino patrol

As endangered animals, rhinos are a must-see for visitors to Kenya. Western black rhinos are already extinct, and northern white rhinos are heading towards dying out. The rhinos you're likely to see in Kenya are eastern black rhinos, whose population shrunk by 98 per cent between 1960 and 1995.

Rhinos shouldn't be approached as they are likely to perceive humans as a threat and charge. Rhinos can reach speeds of 50 kilometres (31 miles) per hour, and their poor eyesight makes it difficult for them to tell a harmless observer from a dangerous predator.

If you take a foot safari watch out for rhino dung. A single rhino can produce 23 kilograms (50 pounds) of dung in a single day, and it's often left in a communal pile. These dung heaps are territory markers for rhinos – humans should stay away.

See lions in action

Typically, lions sleep up to 20 hours per day. They are mostly active at night, with much of the exciting action happening during darkness. To maximise your chances of seeing lions do more than doze, it's best to go where the prey is. Masai Mara National Reserve is a hotspot of lion activity as it's full of prey species and their young. Tell your tour guide what you're hoping to see as they will know the animals and the area like the back of their hand.

If you can, take a safari at dusk, with night vision equipment to hand. Many reserves don't allow this, but most private conservancies do. Use a torch to look for the glint from a lion's eye, then switch to infrared and watch the action unfold. Lions give tell-tale clues when they are about to attack. One lion will get to its feet and nuzzle another. Soon, the entire pride will be on its feet. Stay still and quiet and enjoy the experience.

Watch buffalo wallow

Gathering in thousands in the rainy season, buffalo can't resist a good wallow in mud. Females and young live in large herds, and males under the age of seven form bachelor groups. Older males prefer the solitary life, but seek out females when it's time to mate in the dry season.

Search for the elusive leopard

You've got to be lucky to see a leopard. They are nocturnal, and extremely well camouflaged. Take a specific leopard tour if you've got your heart set on seeing these spotted cats. They can be seen resting in trees or visiting water holes during daylight hours, so you've got a chance.

Be amazed by elephants

There's nothing like watching wild elephants. Their sheer size is incredible, but safari-takers will be surprised at how gentle and graceful they are. Groups are made up of females and their babies, who stay by their side for life. Males leave their natal group when they reach maturity and leave in search of females to mate with.

For a truly stunning picture, look for elephants in Mount Kenya National Park. The mountains are an iconic backdrop for the planet's biggest land animals. They form enormous herds in this park, and visiting elephant researchers even deliver talks at local lodges from time to time.

Visiting a sanctuary like the David Sheldrick Wildlife Trust guarantees elephant sightings and even offers up-close encounters with elephants. Private conservancies are also excellent for elephant sightings.

...and the Little Five

Elephant shrew

These insect-eating mammals live in pairs, but only keep in touch by leaving scent trails. They don't tolerate others sneaking on to their patch, and scream at intruders they spot.

Buffalo weaver

This bird follows buffalo and picks out insects from the soil disturbed by their hooves. They prefer to eat caterpillars, butterflies and beetles, but occasionally eat seeds.

Leopard tortoise

When it's too hot, leopard tortoises perform summer hibernation, a process known as aestivation. They eat hyena faeces and chew on bones they find as a source of calcium.

Antlion

Named after what they eat, these insects dig traps for ants to fall into. The antlion waits in the bottom of the pit, hidden by sediment. It makes the hole deeper until the ant cannot escape, then eats it.

Rhinoceros beetle

A subfamily of scarab beetles, rhinoceros beetles can lift objects up to 850 times their own body weight. That's the equivalent of a human carrying nine fully grown elephants.

Spot zebras

This is one animal you will definitely see whilst on safari. They can be found in their thousands in the Masai Mara National Reserve, as well as in Tsavo National Park and Samburu National Reserve. There are two species of zebra in Kenya: Burchell's zebras in the western and southern parks and Grevy's zebras which are restricted to northern Kenya. The endangered Grevy's zebra is the largest of the equids, it has more stripes and a pure white underbelly. They can generally be found grazing by a water hole.

Get close to giraffes

A visit to kenya is the perfect opportunity to see the world's tallest mammal. Giraffes only spend between 10 minutes and two hours a day sleeping and can generally be found standing eating from acacia trees using their long tongues. There are three species of giraffe in Kenya: the reticulated giraffe in the north, the endangered Rothschild's giraffe in Lake Nakuru National Park and the Masai giraffe in the Masai Mara.

Top wildlife photo tips

Take multiple memory cards
Pack spare memory cards and batteries for your camera in case you experience technical difficulties. Back up your photos at the end of each day to make sure your files are safe.

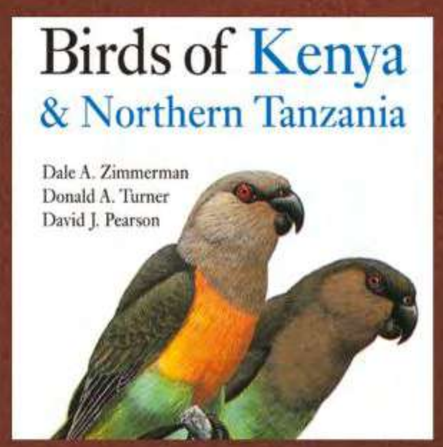
Use a long lens
To minimise the risk of disturbing a wild animal or putting yourself in danger, use a lens with 300 magnification or more. Pad it to prevent damage when shooting on the move.

Create photo drama
Choose aperture priority mode and select the highest f-stop setting. Pan along with a running animal and take a burst. The animal should be in focus but the background will blur.

Go go gadget The essential kit to make the most of your trip

Try a GoPro
Record your entire safari experience with the mini camera that packs a punch
From £99
www.gopro.com

Keep on track
Use a handheld GPS to make sure you don't get lost on foot
From £73.50
www.handtec.co.uk



Know your birds
Identify every feathered friend you see with a Helm Field Guide
£26.99
www.bloomsbury.com

Stabilise your camera
Take a light-weight monopod to prevent your photos from blurring
£29.95
www.jessops.com

Get close from afar
The Endeavor ED II 8320 model from Vanguard works well in low light
£399.99
www.vanguardworld.co.uk

Who to travel with

Budget
Responsible Travel
WWW.RESPONSIBLETRAVEL.COM
Kenya Wildlife Camping Safari
From £1,785 per person for 8 days, excluding flights

Family
Kuoni
WWW.KUONI.CO.UK
Big Five Safari
From £2,139 per person for 7 days, including flights

Luxury
Steppes Travel
WWW.STEPPESTRAVEL.CO.UK
Elephant Insight Safari
From £12,995 per person for 11 days, including flights

All About

African elephants

The largest living land animal is a gentle giant with tight social bonds. Unbelievably these creatures even share similar emotional attributes to humans

Anatomy of an African elephant

As the largest living land animal, with a weight rivalling that of a family car, the elephant relies on several key adaptations to help it survive on the African plains

AFRICAN BUSH ELEPHANT
Loxodonta africana
Class Mammalia

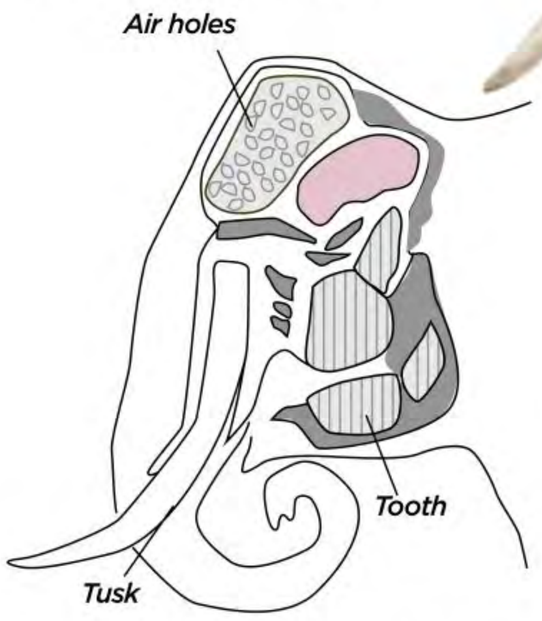
Territory Sub-Saharan Africa
Diet Herbivore
Lifespan 70 years
Adult weight 2,200-6,350kg / 4,850-14,000lbs
Conservation status

EX EW CR EN **VU** NT LC

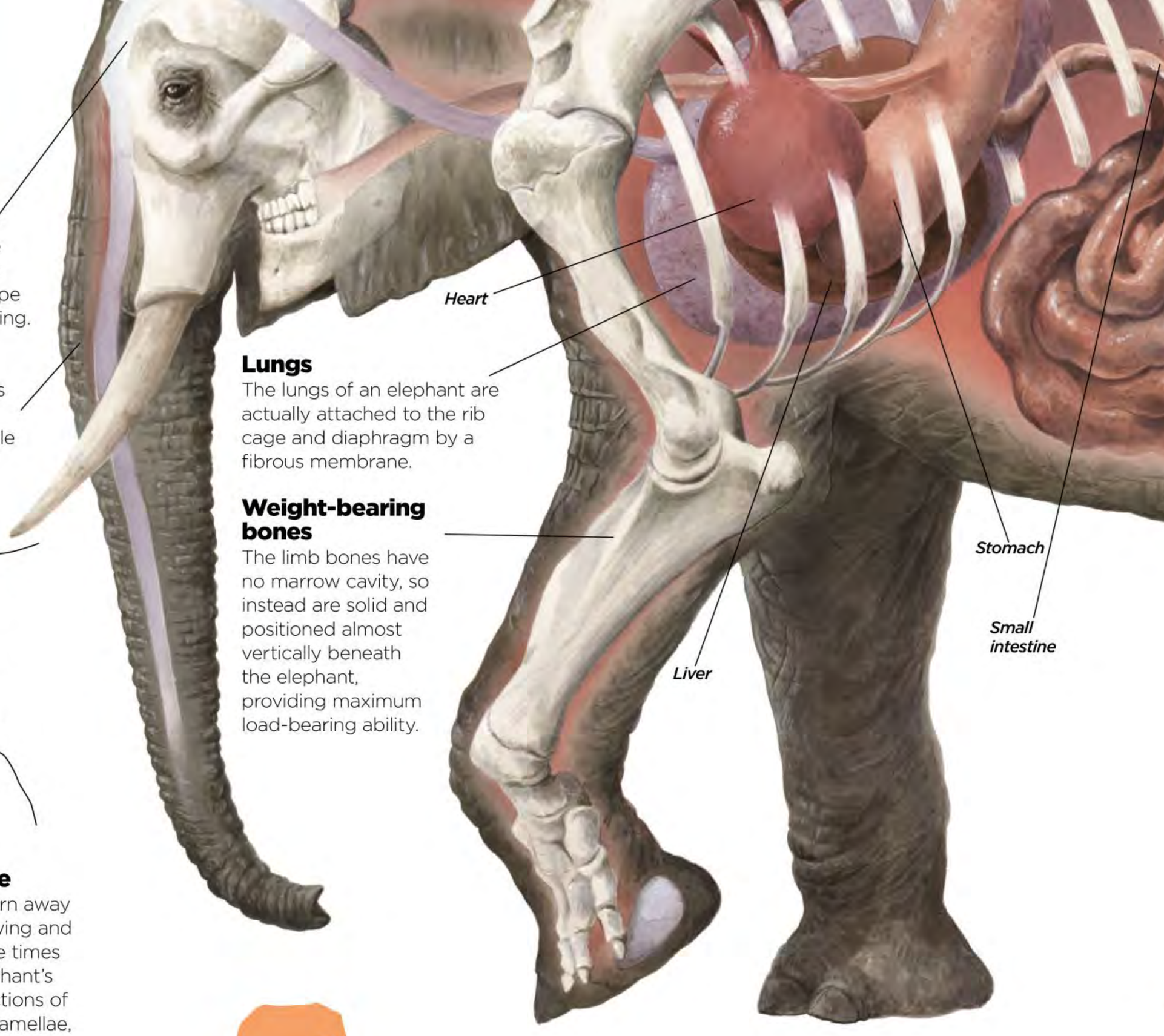
VULNERABLE

Skull
Elephants consume their entire body weight every 20 days, so their skulls are very large to cope with the huge amount of chewing.

Trunk
This has no bones and contains upwards of 100,000 muscle fascicles. Two projections enable the animal to grasp objects.



Lamellae
The teeth are worn away by constant chewing and are replaced five times during the elephant's lifetime. New sections of tooth, known as lamellae, push forwards from the back of the jaw.



Lungs
The lungs of an elephant are actually attached to the rib cage and diaphragm by a fibrous membrane.

Weight-bearing bones
The limb bones have no marrow cavity, so instead are solid and positioned almost vertically beneath the elephant, providing maximum load-bearing ability.

INFANCY

Birth *0 months*
At 120 kilograms (265 pounds), a newborn African elephant already weighs more than an adult man.

First steps *30 minutes*
After 22 months curled up in the womb, the calf's legs are often bent, but they quickly straighten out to the right shape.

Suckling *0-3 years*
Male calves suckle more often than females and the size difference becomes evident within the first couple of years.

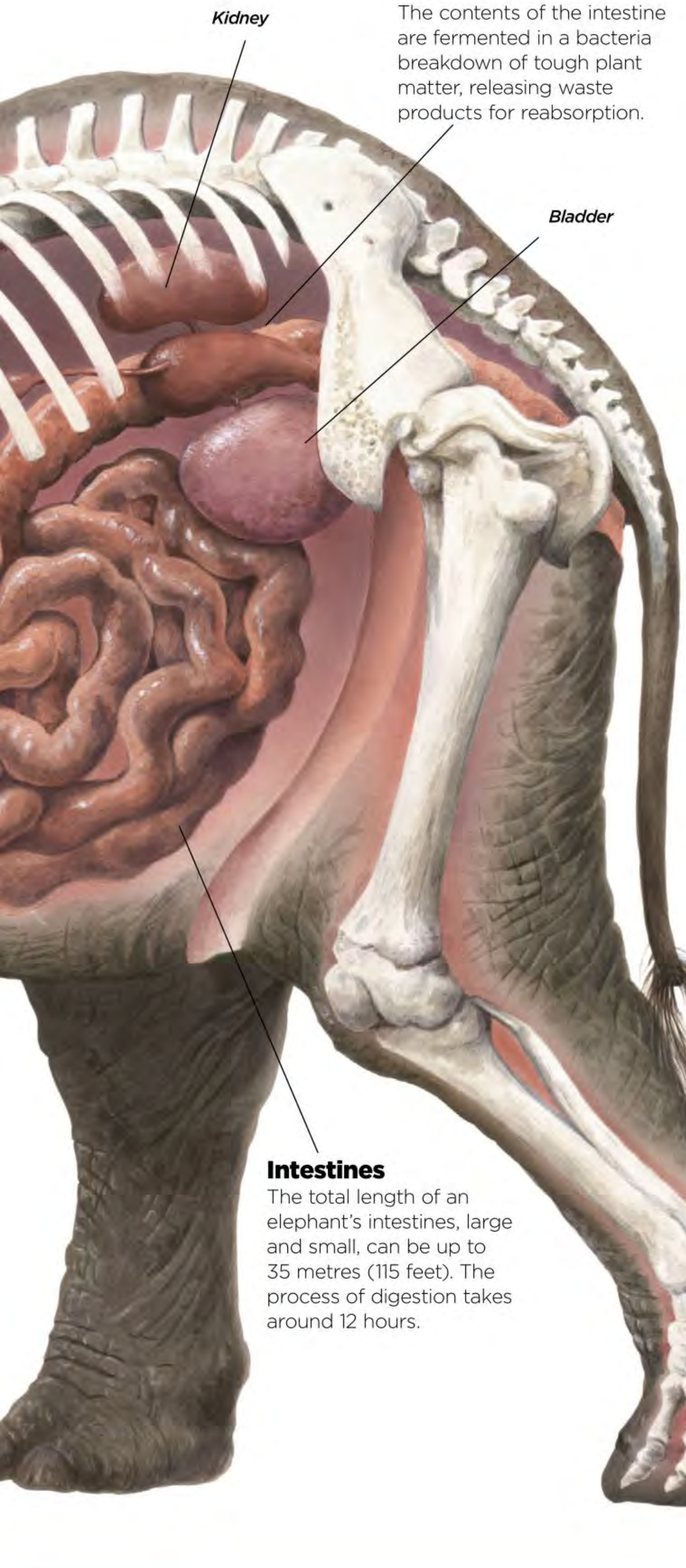
JUVENILE

Mastering the trunk *1-5 years*
The trunk is a complex organ, with thousands of muscles and no bones.

Weaning *3-5 years*
Calves continue to suckle until a younger sibling is born. At this point there may be some sibling rivalry.

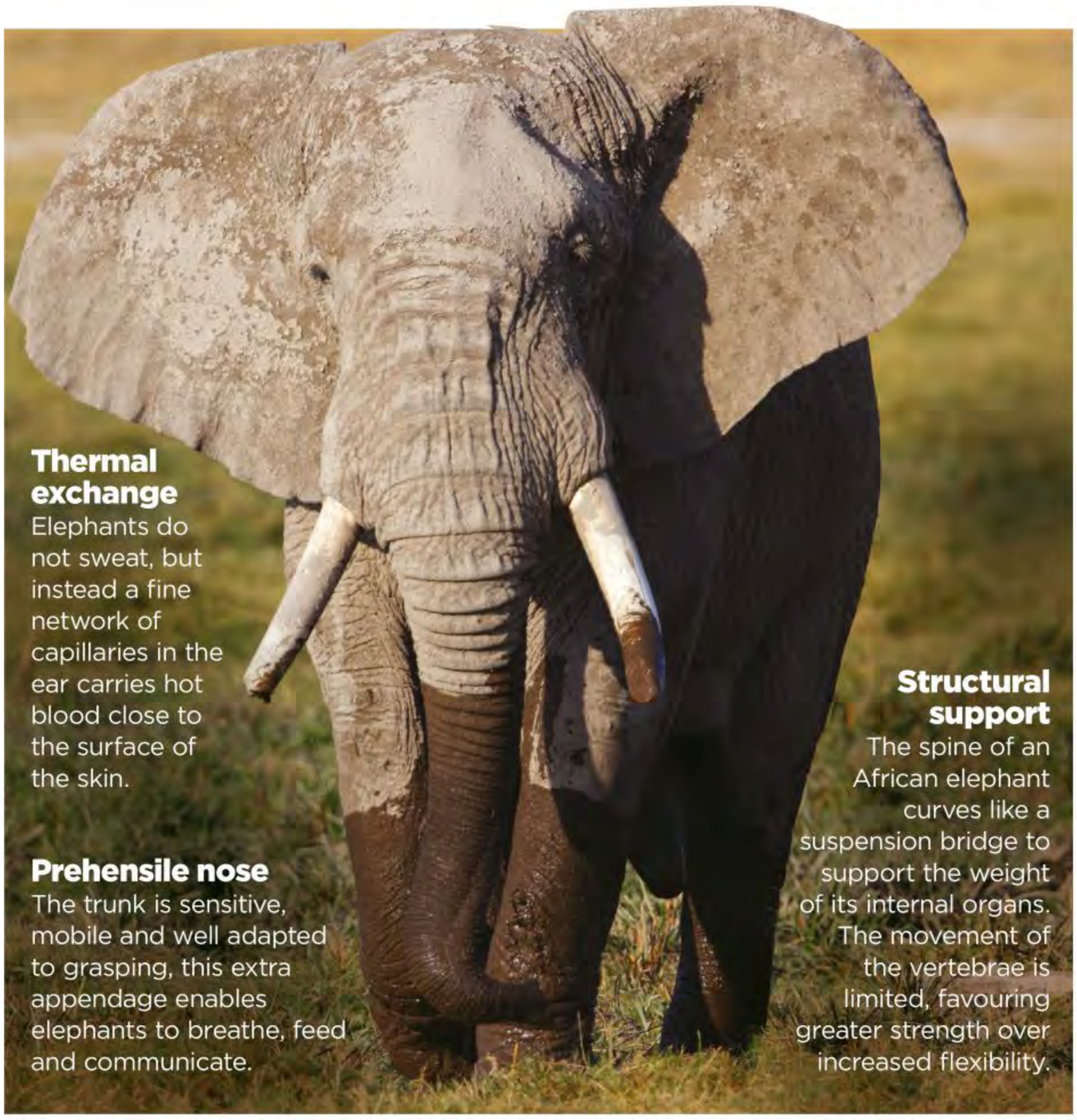
MATURITY

Sexual maturity *12-14 years*
Male and female elephants reach sexual maturity in their early teens, but don't often mate until their twenties.



Caecum
The contents of the intestine are fermented in a bacteria breakdown of tough plant matter, releasing waste products for reabsorption.

Intestines
The total length of an elephant's intestines, large and small, can be up to 35 metres (115 feet). The process of digestion takes around 12 hours.

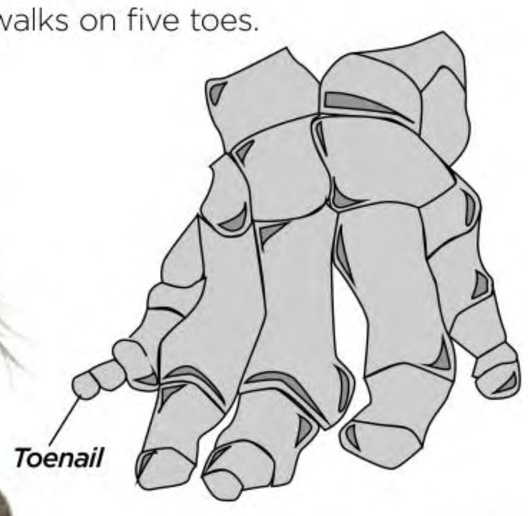


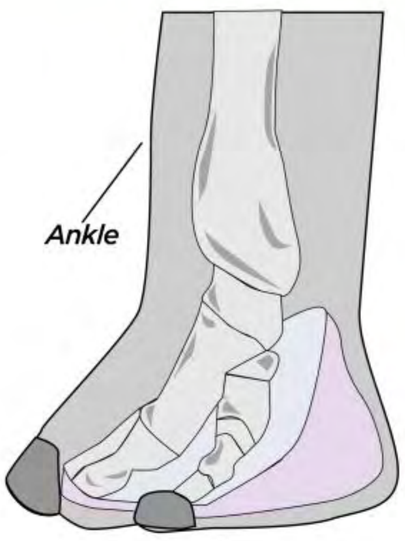
Thermal exchange
Elephants do not sweat, but instead a fine network of capillaries in the ear carries hot blood close to the surface of the skin.

Prehensile nose
The trunk is sensitive, mobile and well adapted to grasping, this extra appendage enables elephants to breathe, feed and communicate.

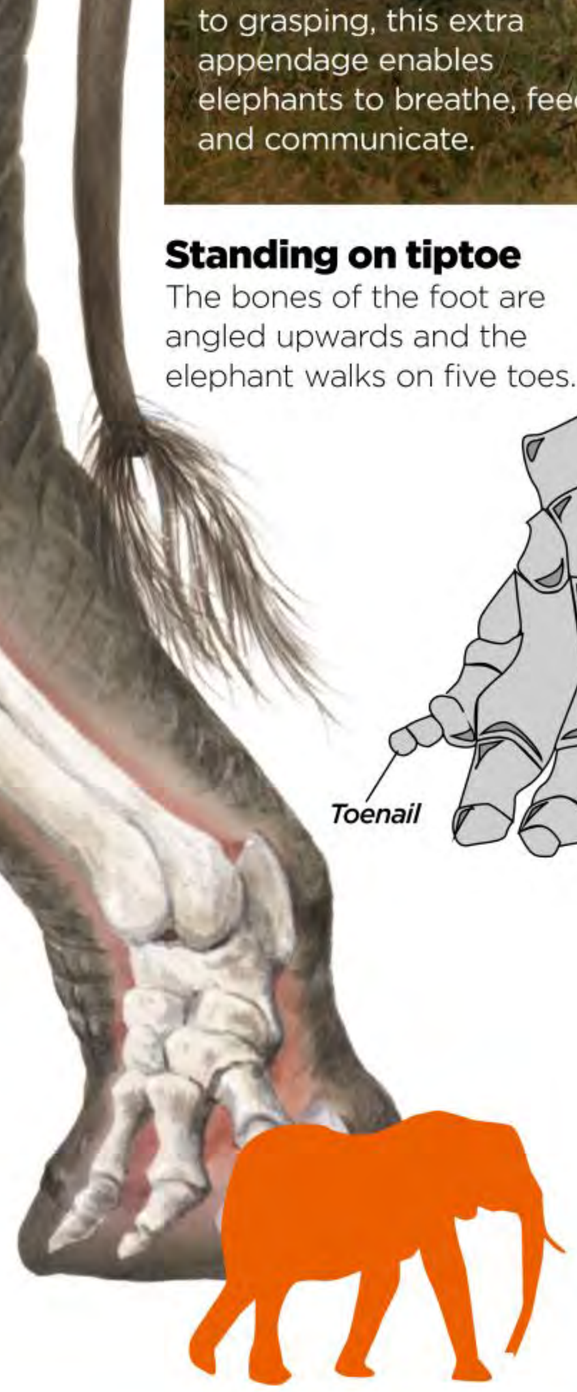
Structural support
The spine of an African elephant curves like a suspension bridge to support the weight of its internal organs. The movement of the vertebrae is limited, favouring greater strength over increased flexibility.

Standing on tiptoe
The bones of the foot are angled upwards and the elephant walks on five toes.





Heel pad
A small fatty pad beneath the heel acts as both a shock-absorber and a light spring.



Leaving the herd *12-14 years*
Male calves don't remain with their families once they reach adulthood, so instead leave the herd to live alone or in bachelor groups.

Reproduction *20-50 years*
A female elephant produces a calf every five or six years during her adult life. The bull plays no role in the upbringing.

Ageing *50 + years*
Elephants can live for up to 70 years in the wild, but females stop bearing calves at around the age of 50, taking on the role of grandmother.

Closest family

Closely related to the African bush elephant are...

Asian elephant
The Asian elephant is smaller than its African cousin and generally weigh about a ton less. Despite their smaller size, the tusks are still highly sought after, resulting in illegal poaching. This has drastically reduced their numbers.

Woolly mammoth
Just like the African elephant, the woolly mammoth was a keystone species. When they died out at the end of the last ice age, the grasslands they inhabited were quickly overrun by vast birch forests, leading to huge, lethal forest fires.

Hyrax
These small mammals are some of the closest living relatives of the elephant. Both are descended from a common ancestor – some of whom took to the water, while others stayed on land, resulting in the modern-day hyrax.

Life in the herd

Elephants develop unbreakable bonds within family groups, baby-sitting one another's young and passing down life-learned rituals

Solitary male
When male elephants mature, they leave their family herd and travel between groups of females in order to maximise their chances of fathering a calf.

A leafy diet
Eating almost any vegetation in their path, 100 per cent of an elephant's diet consists of many plant species. An average male eats 150 kilograms (330 pounds) per day.

The matriarch
Elephant society revolves around a single dominant female. As the eldest female in the group, the matriarch is a skilled mother who can have over 50 years of experience of the local environment. Her knowledge of water sources, migration routes and feeding grounds is vital to the survival of the herd, passed down through the generations.

Young calf
Calves remain close to their mothers for protection. If the pair becomes separated from the rest of the group, they remain in constant contact using low-frequency rumbles.

Lions look for calves
While the African elephant has no natural predators, some desperate big cats may try their hand at taking a stray elephant calf. Some lion prides will prey on juveniles during the drought months.

Shared responsibility
Aunts, sisters and grandmothers all care for the calves. They often cluster around at the birth of a newborn and work together to shield their vulnerable young from threats.

Social bonds
Female elephants remain with their family for life and develop strong bonds with their mother, sisters, aunts and nieces. They gather around to share important moments, such as the birth of a calf, and remain in regular communication with low-frequency sound. After even short periods of separation, elephants greet one another affectionately by touching trunks.

Living alongside others
The watering hole doesn't just attract the elephant herd, as other animals take advantage of the site. They do so with extra caution, as the area is a hot spot for predators lying in wait.

"The matriarch is a skilled mother who can have over 50 years of experience of the local environment"

Inside the minds of giants

The intricate social structure of an elephant herd is made up of strong emotional attachments that continue even after death

BELOW Dust baths help elephants to keep their skin free from parasites

African elephants are intelligent, social animals, living in close family units of related females and their young. Each herd is led by a matriarch – the oldest and most experienced member of the group. Female elephants remain with their families for their entire lives and over time the knowledge of the matriarch is passed to the younger members of the group. This kind of cultural learning has enabled migration routes to be remembered for generations. Compacted tracks of one to two metres (three to six feet) wide, and tens of kilometres long, scar the African landscape.

Social bonding is extremely important within herds of elephants and, even when separated, families remain in constant contact with one another using a series of low-frequency rumbling sounds. Some are audible to the human ear, but the farthest-reaching are infrasonic and can travel distances of up to five kilometres (3.1 miles). Elephants also have a keen sense of smell, raising their trunks to identify scents travelling on the wind. When reunited after a period of separation, elephants use their trunks to gently touch and smell one another.

African elephants aren't territorial and families travel great distances to find food and water, with a home range of between 15 and 1,500 square kilometres (six to 580 square miles). The ranges of different herds often overlap and separate groups will form social attachments, occasionally travelling together. These groups are even able to recognise one another after long periods apart. Occasionally very large herds of 500 to 1,000 individuals come together, particularly during migration.

The top priority of an elephant herd is water – an elephant must drink 200 litres (44 gallons) of water every day. They also have fantastic memories and in times of drought the matriarch of the herd can lead her family to remote watering holes that they haven't visited in years.

Elephants are most active in the cooler hours around dawn and dusk, spending most of their time eating. They're also hugely destructive and a herd can rapidly decimate vast areas of vegetation, making visible alterations to the landscape; a 45-centimetre (18-inch) tree trunk can be felled with just a gentle push.

During the hottest part of the day, African elephants will often seek shade, standing motionless with their eyes closed to prevent overheating. They also wallow in water, dust and mud, using their trunks to spray their bodies and allowing evaporation to cool their skin. The coating of dried mud left behind provides some protection from sunburn and can be used as an exfoliator to dislodge parasites from the skin. They don't sleep until the early hours of the morning and spend just four hours resting, either standing, or lying on their sides. This is to avoid crushing their lungs under their huge weight.

"The matriarch can lead her family to remote watering holes that they haven't visited in years"

He who wins, mates

How courtship rituals and a group mentality ensure the survival of this giant mammal

When male calves mature, at around the age of 12, they leave the family group. Some become solitary, while others join bachelor males, banding together for security. Males establish a hierarchy within these groups, lightly sparring with their tusks and grunting to display their dominance.

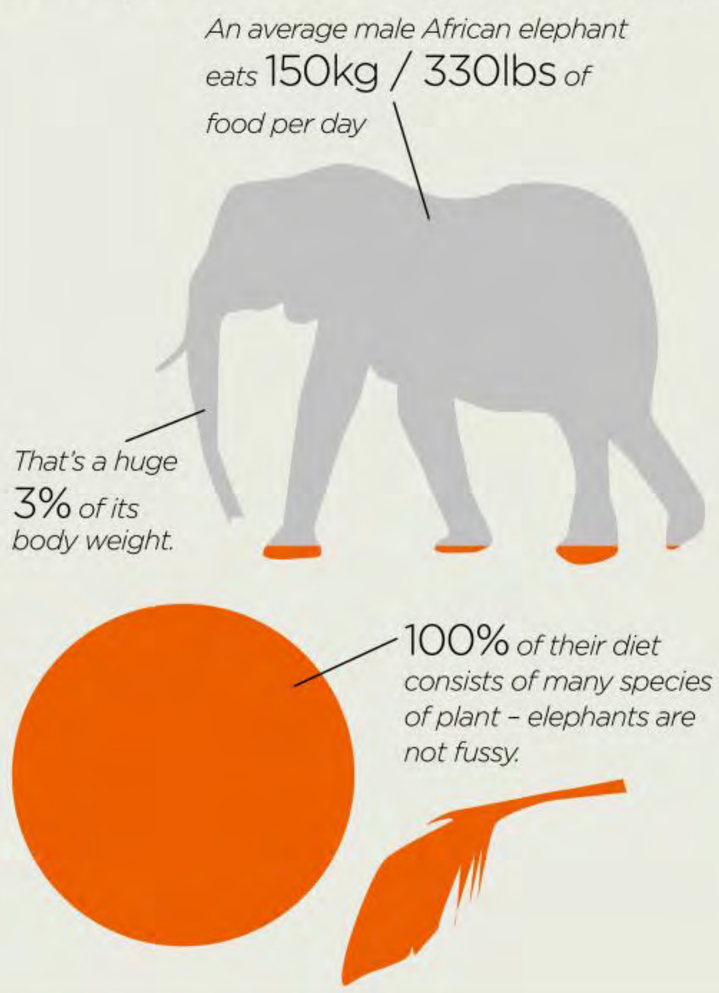
Once a year a male elephant's testosterone levels rise, making him excitable and aggressive. Sparring may escalate to fighting during this time and although serious fights are uncommon, the sharp tusks can inflict fatal damage.

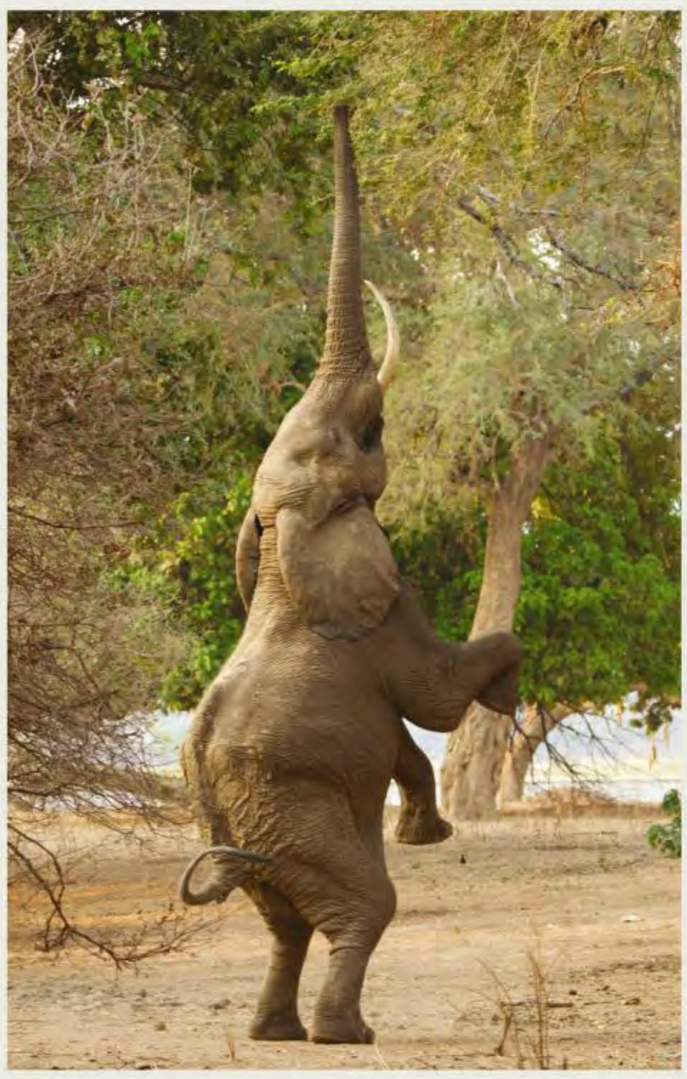
Males mate more during this period, but will search for females throughout the year, moving through different family groups. Female African elephants enter their fertile period once every four months, but are only receptive to mating for a few days, so it's down to the male to be able to identify the short window of fertility. Females use a special call to alert nearby males, while the bulls themselves respond to chemical signals.

Elephant calves can be conceived all year, but the peak time is just after the rains. Unlike many animals, female elephants don't retreat to the safety of a nest to give birth. Instead, the herd gathers around to protect and assist, helping to free the calf and lift it to its feet. This co-operation continues as the calf grows up and if the infant is threatened, the rest of the herd will step in, protecting it with their legs, or lifting it to safety.

Anything (vegetation) goes

African elephants will eat almost any vegetation in their path





Mourning the dead

The reaction of elephants to the bones of their own species is unique in the animal kingdom

We may think that burial rituals and rites separate us humans from the rest of the Animal Kingdom, but it seems elephants also mourn their dead.

Not only do they pause to quietly examine the bones of other elephants, but when a family member dies, elephants appear to be agitated and often stand guard over the body. This can sometimes go on for several days at a time, suggesting a grieving period.

Surviving the savannah

Elephants once roamed across the entire continent of Africa, but the species is now restricted to around 35 states south of the Sahara desert. As a species, they're surprisingly adaptable and can be found in a variety of habitats, from the rich grasslands of the Okavango Delta, to the arid deserts of Namibia.

In the 1930s there were an estimated three million elephants in Africa, but excessive hunting for tusks, meat and skins resulted in a huge decline in numbers. By 1985, 1,000 tons of ivory were being exported from Africa each year, so in an effort to preserve the elephant the international ivory trade was banned in 1989.

In spite of this, illegal poaching still continues and an estimated eight per cent of the elephant population is killed every year. Most ivory is exported to Asia, ending up as ornaments or jewellery sold to international tourists.

The conservation of the African elephant is of huge importance to the biosphere, as it's a keystone species, shaping the environment and making changes vital to the survival of other life in the area. During times of drought they use their tusks to dig into the ground, exposing water hidden below the surface. Their enormous appetites clear swathes of trees and shrubs from the savannah, making space for grasses that feed grazing animals such as gazelle. African elephants ingest huge quantities of vegetation, eating seeds and travelling for several kilometres before depositing them on the ground. 90 species of tree in Africa are known to rely on elephants for propagation.

With the creatures' bodies weighing more than a car, even just walking across the ground has an affect on the ecosystem, disturbing insects and providing an easy meal for waiting birds.

Retracing footsteps
Elephants are known to revisit the exact same places year on year, cutting vast pathways across the African plains.

In our culture

Elephants inspire some of our best-loved characters

Dumbo
In the 1941 Disney film of the same name, Dumbo is an elephant calf who is mocked by the rest of the circus animals for his uncharacteristically large ears.

Horton
In *Horton Hears a Who!* by Dr. Seuss, Horton the elephant discovers a microscopic world on a single speck of dust floating through the air. This turns out to be Whoville.

Ganesha
Ganesha is a widely worshipped deity across Jains, Buddhists, and beyond India. As the god of beginnings, he's the patron of arts and sciences as well as the deva of intellect and wisdom.

Environmental factors

The African elephant is a vulnerable species

The ivory trade
There has been a global ban on international ivory sales for decades, but there's still a high demand for elephant tusks. Illegal poaching is still a huge threat to their survival.

Human conflict
Expansion of settlements across Africa has brought elephants into contact with humans. They can cause damage to property and have been known to kill or injure people.

Habitat loss
An estimated two thirds of African elephant's habitat disappeared between 1979 and 2007, restricting their range and exposing previously protected areas to poachers.

Climate change
Africa is vulnerable to the effects of climate change. The average temperature has risen by almost a degree over the last century and is expected to rise even further.

The African elephant and humans

The majority of African elephant habitats are unprotected, so migration routes have been fragmented by farmland and infrastructure. Wild elephants living in protected areas pose little threat, but when these gentle giants come into contact with human settlements they can cause significant damage. Elephants can be hugely destructive, uprooting trees and trampling buildings.

The impact that this has on small villages, particularly during periods of famine or drought, can be significant, so despite their status as a vulnerable species, problem elephants are often shot and killed. In Kenya alone, 50 to 120 elephants are lost every year to human conflict.

Conservation measures are being introduced in an effort to limit trouble between humans and elephants. In some countries farmers are encouraged to leave safe wildlife corridors, allowing elephants to travel without crossing onto human-inhabited land. In other places natural elephant deterrents, such as chilli and tobacco, keep the animals away.

Follow the lead
The herd are totally reliant on the matriarch and will follow her to find water.

The first few weeks on the plains

Elephant herds are constantly on the move, trekking back and forth between feeding grounds and water sources. When a calf is born, it's vital that it's able to keep up with the herd.

Elephant young spend nearly two years in the womb and by the end of pregnancy they're heavier than an adult man. As a result, during the last few months before birth, they have little room to stretch out and are often born with bent legs.

With a little help from their mothers, aunts and older siblings, calves are quickly able to find their feet and most are up and walking within the first half an hour following the birth.

Nearest neighbours

The African elephant is one of the big five most challenging game, prized by trophy-hunters

Black rhinoceros
Black rhinos are prized for their horns, which are used in traditional Chinese medicine and to make handles for ceremonial daggers. The species is Critically Endangered as a result of widespread hunting.

Cape buffalo
Weighing over 700 kilograms (1,500 pounds) and with huge curved horns, this buffalo is large and unpredictable. It's arguably the most dangerous of the big five, thought to kill around 200 people every year.

African lion
The lion is the second-largest of the big cats after the tiger and is one of Africa's most powerful predators. A team of lionesses can tackle prey as large as an adult buffalo, taking it down with deadly efficiency.

African leopard
The smallest of the big cats is elusive and highly adaptable. However, a combination of habitat loss, persecution by humans and trophy-hunting is taking its toll on the species and numbers are declining.

JOURNEY WITH GIRAFFES

They may be the tallest mammals on Earth, but giraffes lead relatively peaceful lives. Conservation expert Dr Julian Fennessy tells us why they are so iconic

Butterfly is standing tall, shrubs rubbing against her impressively large body as she searches for food among the African woodlands. Her eyes – the largest of all terrestrial animals – search the trees for the tastiest greenery, her eyelashes helping to protect against the sharp thorns as they rub against her face. The young giraffe follows the same routine: an early-morning feed on the shrubs, grass, fruit and twigs of trees, some time for ruminating and then a return for food before the Sun goes down in the evening.

For Dr Julian Fennessy, executive director of the Giraffe Conservation Foundation (GCF), such scenes are a joy to watch. "In some areas, giraffes have more than 100 different types of plants that are part of their diet," he says. "They're a ruminant, just like a cow, and they have four stomachs, so they sit there and chomp away all day, bring it up and chew the cud."

Dr Fennessy is a conservation scientist and a founding trustee of the GCF. With 15 years of experience in species and habitat ecology, conservation and land-management, he left his native Australia to live in Namibia more than a decade ago. He studies the life of giraffes across Africa and has become one of the world's foremost experts in the field of giraffe conservation. He gets to see these magnificent creatures – the tallest mammals on Earth – each day.

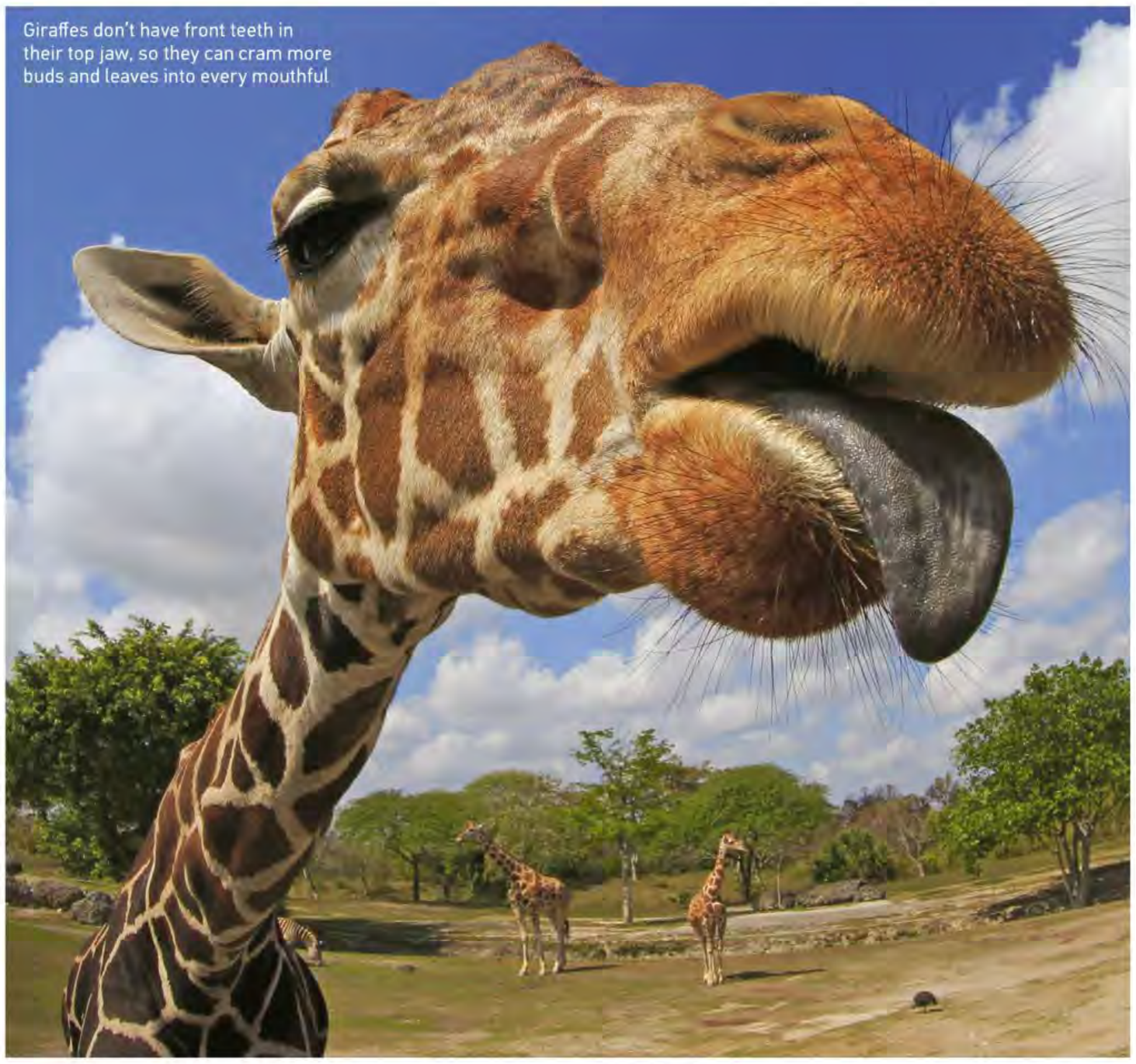
"The giraffe is one of the most iconic animals in the world," he says. "Everybody loves the giraffe. It's a motto. It's a logo. It's a symbol of everything from school and children's toys, all the way through to governments. In Tanzania it's their national symbol."

Food is important for giraffes. They browse trees, extending their prehensile tongues deep into greenery to find the tastiest plants, caring little if the sharp thorns rub against their faces. The tough nature of their long, dexterous tongue, lips and ridged palette enable them to munch away without a second thought using their back teeth – they don't possess front teeth in their upper jaw – which boosts the number of leaves and buds available to them in one mouthful.

At Butterfly's feet is her calf, Angelo, now more than 12 months old. She is protective of him – his vulnerability in the first year of his life having put him at risk of predators. However, Angelo is one of the lucky ones and his protective mother, along with his instincts, have served him well against lions, hyenas and leopards. He has already learned to feed off his mother's milk, having been reliant on it for between 9 and 12 months. Now he too has come to enjoy the spoils of the grasslands, open woodlands and savannahs of Africa.

As well as nourishment, Angelo is able to gain most of his water from the plants he eats, drinking only once every few days. He can absorb moisture from the condensation on leaves at night and his long neck and legs, like those of his mother and other giraffes, enable him to pick at food that's out of reach of most other animals, ensuring a plentiful supply of nutrients and calcium. In return, Angelo will help to pollinate plants – a giraffe's appetite for acacia seeds also boosts the potential for seed-germination in unshaded habitats.

"The males generally spend a large portion of their day eating – on average more than 50 per cent," says Dr Fennessy. "They also spend a lot of time being vigilant." The threat of predators – in particular the lion – means giraffes will spend the bulk of their days standing up, ready to make a run for it at up to 56 kilometres (35 miles) per hour. Nights are usually spent lying down but this makes them more prone to attack, as lions seek to go for the nose or throat. Sleep patterns are restricted to a few minutes at a time, with the neck curved around so that they can rest their heads on their bottoms, still able to keep a watch and defend themselves if needed. Their colour vision, acute sense of smell and good hearing enable them to be ever-alert and, at times of crisis, they'll emit a sound rather like a cow or will grunt to warn predators away. Otherwise they're peaceful animals, prone to violent outbursts from time to time, but they are mainly calm and quiet.



Giraffes don't have front teeth in their top jaw, so they can cram more buds and leaves into every mouthful

"Angelo is one of the lucky ones and his protective mother, along with his instincts, have served him well against lions"

Africa suits Angelo and the rest of the giraffe population. "Giraffes roam across a wide range of habitats," says Dr Fennessy. "Books will say they're limited to the savannah environment, which is the typical east-African acacia umbrella thorn, but they really occur all the way into semi-arid and arid environments in the desert of north-west Namibia. Here they walk across gravel plains for 70 kilometres (43 miles) with not a tree in sight to the next river area. Rivers are a loose term because there's no water there – that only comes a couple of days a year."

As browsing herbivores, giraffes reach up to the high treetops

Giraffe Conservation Foundation

Giraffes are more endangered than originally thought, but a lot of conservation work is being done do reverse this

The Giraffe Conservation Foundation is at the forefront of efforts to maintain and boost healthy population numbers of giraffes. Executive director Dr Julian Fennessy encourages people to assist through donations, but just as importantly there's also information about giraffes on the website (**www.giraffeconservation.org**) and the Foundation can provide posters, send packs to schools and answer questions. "People can find out about giraffes, read about them and the plight they're in," says Dr Fennessy.

Meet the giraffes of Namibia

The Giraffe Conservation Foundation aims to protect and assess the giraffe populations of Namibia. While establishing their exact numbers and distribution, the team often follows the lives of individuals, from calves to elders

Angelo

Having grown to become a dominating bull, Angelo left his mother at 15 months to join a bachelor herd, where he remained for a few years before fighting it out for a mate. As he moved into old age, he became more solitary, as male giraffes will tend to do.

Daisy

Ready to have her own calf at the age of four, Daisy was the centre of competing attention but spent her formative years in a herd with some younger males. Giraffes have one calf at a time, although on rare occasions twins will be born.

Tall Boy

Young Tall Boy found his feet within an hour of being born and spent the first 12 weeks reliant on his mother's milk. He weighed in at a hefty 15 stone when he dropped five feet to the ground, but growth spurts doubled his height in a year.

Butterfly

Butterfly is the mother, attentive and caring. For more than a year after giving birth, she nurtured Angelo, helped him find his first steps, taught him about the dangers of predators and protected him. She lashes out at anyone attempting to harm her calf.

GIRAFFE
Giraffa camelopardalis
Class Mammalia

Territory Africa
Diet Herbivore
Lifespan 25 years
Adult weight Up to 1,930kg / 4,250lbs
Conservation status

EX EW CR EN VU NT LC

LEAST CONCERN

In order to drink water, Angelo must lower his head, but his neck is too short, so it doesn't reach the ground. He has to kneel or spread his front legs so his body can get lower to the ground. He can then enjoy some refreshment, safe in the knowledge that the neck's veins contain valves to prevent a large rush of blood to the head – something that would knock him unconscious. It's one of the few disadvantages the giraffe's long neck brings. The other is the need for increased blood pressure, which is twice that of other large mammals. Without this increased blood pressure, gravity would prevent blood from flowing up the giraffe's neck to their brain.

As Angelo grows older, his sexual appetite emerges. From a newborn calf weighing around 100 kilograms (16 stone), he has now become a rather large animal, having doubled in height over the first year. Continuing to grow, he left his mother at 15 months and formed an all-male group. "Giraffes go in and out of family groups," adds Dr Fennessy. "We don't know what they are, but we don't think they have very tight bonds, apart from [between a] mother and calf. As they get a couple of years older, they definitely have loose affiliations and they go in and out in search of food, mostly." Females

ABOVE Each giraffe at GCF is closely monitored by the dedicated team

BELOW Monitoring giraffe numbers is an important part of protecting the species

African Wildlife

Nine hidden species

Although they may look alike, there are actually nine sub-species of giraffe identified by their remarkable patches. These enable the animals to release heat and provide camouflage

Africa

Nigeria

Mozambique

South Africa

Nubian giraffe

Giraffa camelopardalis camelopardalis
Ethiopia, South Sudan

The patches are chestnut-brown in colour with four sides on a background that appear to be off-white, giving them a distinctive coat. With very low numbers in the wild, this variety is in danger.

Reticulated giraffe

Giraffa camelopardalis reticulata
Ethiopia, Kenya, Somalia

Common in zoos and with huge patches that dominate its body, the reticulated giraffe actually appears to have a series of lines running across it, but the patches fizzle out towards the white legs.

West African giraffe

Giraffa camelopardalis peralta
Republic of Niger

The light spots of the west African giraffe mark it out against other subspecies. They split their time between the lowlands of the Niger River and drier, higher lands.

Kordofan giraffe

Giraffa camelopardalis antiquorum
Chad, Central African Republic, Cameroon, Democratic Republic of Congo

This subspecies has small, irregular and pale spots, with a covering on the inner legs. They live in some of the most war-torn countries in Africa.

Rothschild's giraffe

Giraffa camelopardalis rothschildi
Uganda, Kenya

Although it's identified by pale-brown patches, the main feature of Rothschild's is the presence of five horn-like protrusions on its head, called ossicones.

Defining species

Dr Julian Fennessy says studies have shown some giraffe subspecies, as defined today, haven't interbred for more than a million years.

"We've got better tools to be able to assess, including genetics and it's likely we may end up with a whole host of species of giraffe out there," he says. "The coat patterns of different subspecies of giraffe are very distinct – they look very different..."

Finding distinct species of giraffe would help make a case for greater care of the animals. To-date, the West-African and Rothschild's subspecies are listed as Endangered.

Thornicroft's giraffe

Giraffa camelopardalis thornicrofti
Zambia

Some studies suggest this species should be merged with the Masai for taxonomy purposes. This variety has large, dark and ragged blotches that look like leaves running down its legs.

Masai giraffe

Giraffa camelopardalis tippelskirchi
Kenya, Tanzania

Like the thornicroft, this giraffe also has large, dark-brown, leaf-like blotches. They're the most populous of all of the giraffes and are one of the most popular tourist sights in Kenya and Tanzania.

Angolan giraffe

Giraffa camelopardalis angolensis
Namibia, Zambia, Botswana

The Angolian giraffe is the subspecies seen by Dr Fennessy on a daily basis. It has large brown patches with notched or angular edges that stop at the upper part of the face.

South African g--iraffe

Giraffa camelopardalis giraffa
Botswana, South Africa, Zimbabwe, Mozambique

As the dark, more-rounded patches of the light-tan-coloured South African giraffe extend down the legs, they get gradually smaller, but then run right down to the hooves.

ABOVE Fights between rival males are often brief, but can be extremely vicious and can end fatally, with the bulls using their long necks as whips

Male giraffes take part in necking, head-butting one another's necks, to establish a hierarchy

"The giraffes go hip-to-hip, ready for action, each animal working out when to strike. One will swing its neck like an out-of-control whip at the other"

seem to behave differently to males. Not only are they ready to breed rather early, from the age of four as opposed to six for males, Butterfly will most likely have formed close bonds with other female giraffes, with research suggesting she may have even tried to avoid those she didn't get on with... It's up to the males to pick the most-suitable female in order to breed.

Angelo is ready for a sexual encounter, but having had a taste for nature's finest growing food, he must assess the suitability of a potential mate by tasting a female's urine. As terrible as this sounds for humans, for giraffes it's a way to detect oestrus – the time when the female is sexually receptive. "The males traverse large areas in search of females that might be receptive for reproduction," says Dr Fennessy. It follows that they must get it right.

The males compete with one another. Angelo stands tall as a rival male tries to take the female he has identified as a potential mate. He rubs his neck along the other male's body as a warning, pushing and shoving to make his point known. The rival gets the message and leaves the path clear, but it could so easily have become nasty. "Battle can rage," says Dr Fennessy. "Giraffes may not be the gentle giants we think they are and a number of recordings from our studies across Africa show that they can die... during these fights. It's not normal. Usually they sort their problems out and the pushing and shoving is all part of the flexing of the muscles and figuring out the hierarchy in the population..."

The giraffes go hip-to-hip, ready for action, each animal working out when to strike. One will swing its neck like an out-of-control whip at the other and try to knock it off its feet. The crunching, cracking sound of each blow is packed with power, with the head becoming a battering ram against the soft underbelly of the rival. Injury can be devastating for a giraffe, putting them at severe risk of a predator, but it only takes one of a fighting pair to stop before peace can break out once more.

"They don't just fight one another," says Dr Fennessy. "They will kick in all directions at predators and there have been stories of lions being killed by giraffe kicks. Predators have to know what they're doing because if they get injured, basically they're not going to survive."

Angelo's new mate, Daisy, falls pregnant and her underbelly grows larger by the week as the 15 months of pregnancy roll by. By the time she is ready to give birth, she looks anxious and her body sways from side-to-side. She lifts each leg off the ground, almost following a set pattern, keen to get the present ordeal over and done with. The birth is proving to be a rather slow process and, having returned to where she herself was born in readiness for her new calf, she is pushing hard but her legs are tiring and she wants to sit. Doing so would crush the newborn so she does all she can to remain standing.

Then it happens. A final push and gravity pulls the baby giraffe down. It falls some 1.5 metres (five feet) to the ground and lands in a heap on the floor, giving it a rather harsh introduction to the world. The calf lies still – his motionless body on the dry, dusty plain with the Sun beating down upon him. Eventually he begins to stir, his head lifts, his ears flap and he tries to stand as his mother bends her two-metre (6.5-foot) neck down towards her newborn to greet him. Within an hour he finds his feet, manages to stand and learns to run. Tall Boy, the latest giraffe to be born in Namibia, has arrived.

Giraffe-spotting

A new citizen science website has been set up that enables people to upload photos of giraffes they have spotted in zoos and in the wild across the world. Go to **www.giraffespotter.org** and help find a true picture of giraffe distribution.

Like Butterfly with Angelo when he was young, Daisy must protect Tall Boy through his first year, nurturing him as he grows to reach a staggering six metres (20 feet), with legs that can be taller than a typical human. All giraffes must look after themselves – a ravenous predator would be eager to chomp into on average 1,500 kilograms (3,306 pounds) of giraffe flesh, but females tend to reach a maximum of 1,180 kilograms (2,600 pounds). Giraffes stand over their calves, using their legs as protection.

"In some populations, more than 50 per cent of little ones die in their first year as a result of predators," says Dr Fennessy. "The lion is their main predator. Giraffes are a large food source, so if you're a lion in a big pride, it's worth a chance. A pride will go for large animals and they can bring down a full-sized male – but it's a bit more dangerous than going for a littler one, which is why calves are so vulnerable."

For the moment, Angelo has become a father, but he isn't around at the time of birth. His job is done, although he will playfully interact with the young from time to time. He'll go back to a life of eating, ruminating and mating, promoting the growth of new forage at the same time. Dr

"Biologically [the giraffe] is a habitat-changer in many places. It opens up landscapes [...] and can change habitats significantly"

BELOW Free-roaming giraffes disperse seeds across the landscape, helping boost plant-growth

What you didn't know about giraffes

Despite its huge length, a giraffe has the same number of vertebrae in its neck as a human – just seven bones.

They are one of only a few species to be born with horns, or ossicones, formed of cartilage and covered in skin.

The males and females eat from different parts of trees, so they don't compete for food and cause any squabbles.

The hair of a giraffe's tail and mane is on average ten times as thick as a single strand of human hair.

Fennessy points out that moderate browsing has been shown to stimulate the production of shoots in certain acacia species and the animals have a great impact on their environment.

"What is amazing is that the giraffe is something so tall, it provides us with a good example of what evolution can lead to in an animal," Fennesy says. "Biologically it's a habitat-changer in many places. It opens up landscapes, maybe not as much as elephants or some cases rhinos, but giraffes can change habitats significantly."

By opening up landscapes, giraffes enable the growth of new forage for themselves and other browsers. They're also able to disperse seeds from one tree, process and then leave them elsewhere in their droppings. By passing through the giraffe's digestive tract, according to the GCF, the seeds' potential to germinate is enhanced. They are also kind to ticks. Although their large eyelashes protect their eyes from insects, ticks live on giraffes and are a good source of food for oxpecker birds. The pair enjoy a symbiotic relationship and without the giraffe, the oxpeckers would be far hungrier creatures. The birds benefit the giraffes too, since they act as a warning system – easily spotting enemies and alerting their host.

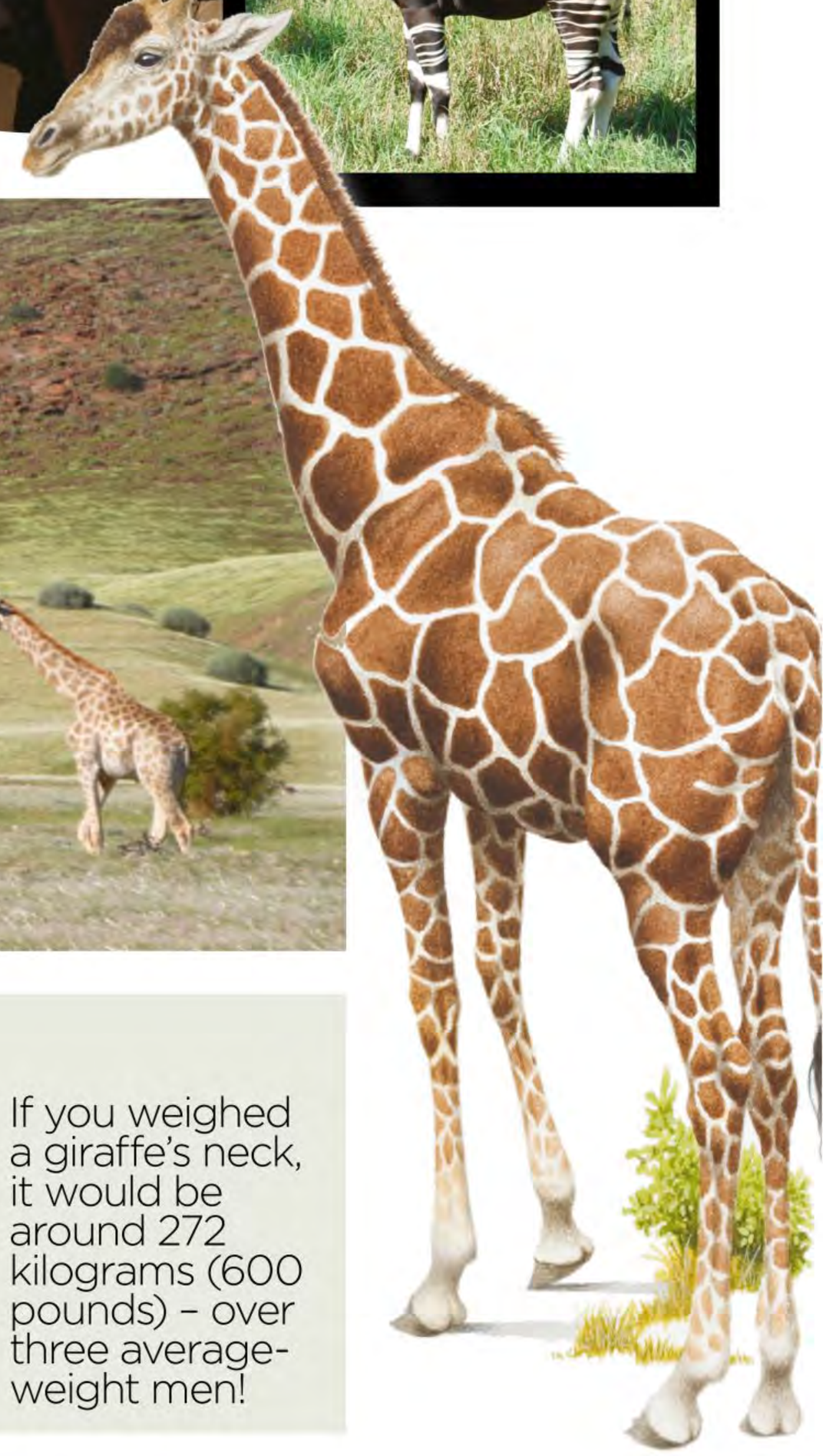
Yet, for all of the good they do for the environment in Africa, the future of giraffes like Butterfly and Angelo is far from certain. "We like to term giraffes as the forgotten megafauna," says Dr Fennessy. "Essentially there's been

ABOVE
The GCF monitors and helps protect giraffes across Africa

Okapi – the long-lost relative

This unlikely cousin has horse-like features as well as an anatomy similar to a giraffe's

If you took a giraffe and squashed it down, you may not think the result would be an okapi. The two animals are closely related, but okapi have zebra-like stripes, which help camouflage them in dense rainforests. Though horse-like, they pull at trees and leaves with their prehensile tongues, enjoy a solitary life and crucially have long necks. Though they baffled experts for years, they're a fascinating relation of the giraffe.



The heart is around two metres away from its head and can weigh up to ten kilograms (aka 22 pounds).

They got their scientific name, Giraffa camelopardalis, because they were thought to be part-camel, part-leopard.

If you weighed a giraffe's neck, it would be around 272 kilograms (600 pounds) – over three average-weight men!

ABOVE Though some subspecies of giraffe have healthy population numbers, others do need constant monitoring for preservation

so much attention on the elephants, the lions and the pandas, that few notice giraffes are suffering the same demise, if not more, than many of these other critters." He says giraffe numbers have fallen over the past 15 years due to habitat loss and fragmentation, as well as illegal hunting. The Giraffe Conservation Foundation is run by volunteers and its aim is to raise awareness of the problem that exists.

"Poaching is a problem in many countries, especially where there's civil unrest," he says. "If you think about northern Kenya, Ethiopia, Somalia, South Sudan, Chad: all these countries are fairly naughty with regards to the political side. We term giraffe poaching often as war fodder, because they're big animals, that aren't very complicated to hunt and you can get a lot of meat out of them, feeding a lot of people, but in central Africa we're down to fewer than 2,000 individuals."

Particular struggles exist in the Democratic Republic of Congo where there is estimated to be less than 50 giraffes remaining in the far north, in the Garumba National Park. This is due to the Lord's Resistance Army, which is constantly causing problems for all animals. "The Central African Republic is also going through a civil unrest at the moment. There's been ongoing poaching for years," says Dr Fennessy. It's sad to note that over the years giraffes have become extinct in seven countries in Africa. "Countries such as Angola and Mozambique have been reintroducing them," he adds. "In Botswana, we predict there's been a loss of probably 60 per cent in the north of the country over the last decade, based on aerial and survey figures. You wouldn't have expected that in a country like Botswana, where governance is very good, but it's most likely poaching has just gone unchecked."

There are some shining lights, though. Namibia's population is increasing and Niger's has increased from 50 two decades ago, to 350 today. "There's been efforts to replant natural food sources such as acacia trees," he adds. "There's also change in government policy so that there are severe penalties for illegal hunters. It's all backed by broader education and awareness, which is critical so that people understand what the situation is."

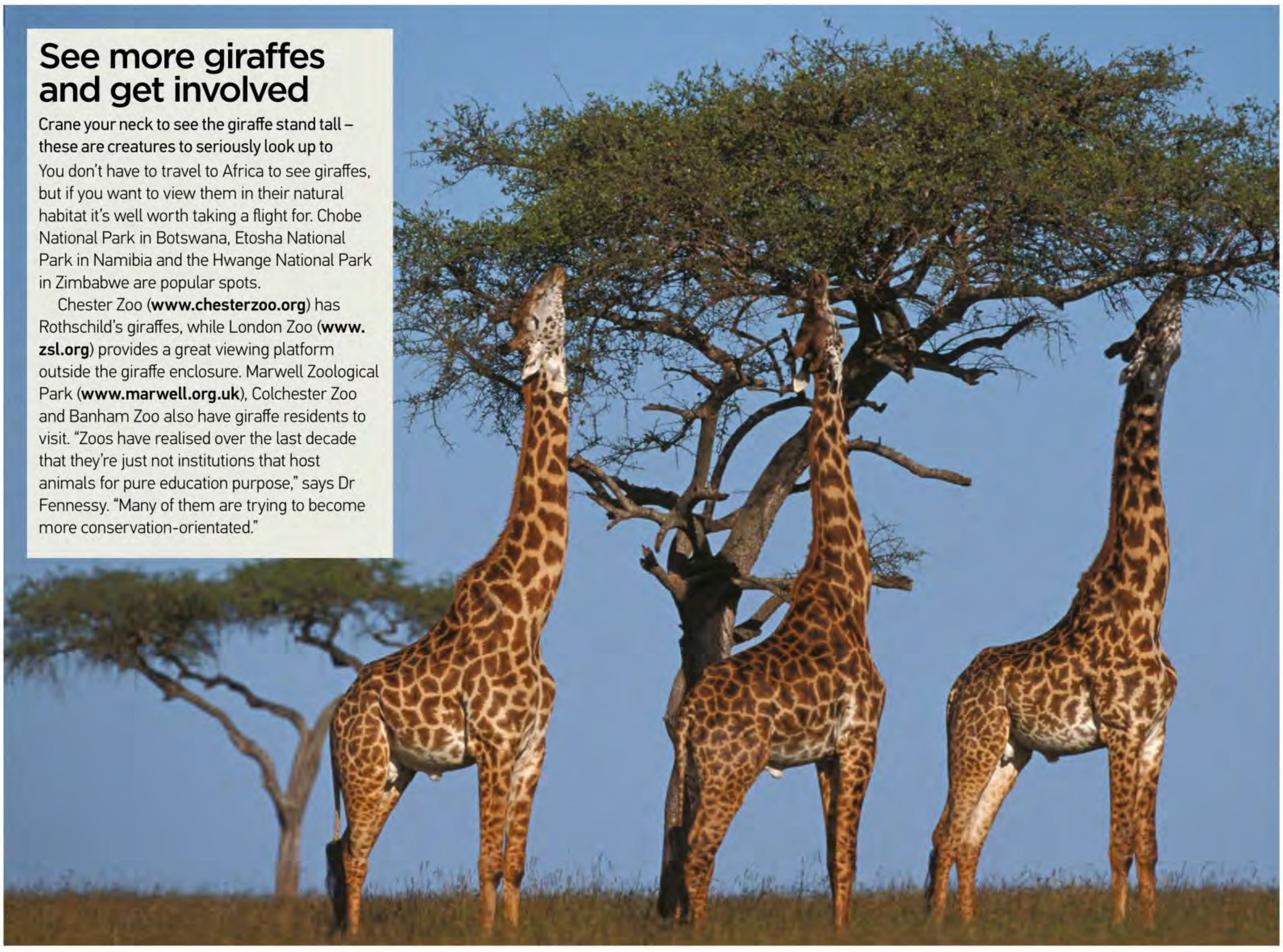
For Butterfly, son Angelo and his own calf, Kaloo, life continued prosperously. Angelo established his own dominance, engaging in a few battles of his own, and winning each one, giving him a good pick of the females and priority over feeding areas. He found himself to be rather effective at seeing off predators, too. Now, at the grand age of 25, he has become an elder. He may be more vulnerable than before, but Angelo has now reached the pinnacle of his lifespan and can watch as the next generation follows.

See more giraffes and get involved

Crane your neck to see the giraffe stand tall – these are creatures to seriously look up to

You don't have to travel to Africa to see giraffes, but if you want to view them in their natural habitat it's well worth taking a flight for. Chobe National Park in Botswana, Etosha National Park in Namibia and the Hwange National Park in Zimbabwe are popular spots.

Chester Zoo (**www.chesterzoo.org**) has Rothschild's giraffes, while London Zoo (**www.zsl.org**) provides a great viewing platform outside the giraffe enclosure. Marwell Zoological Park (**www.marwell.org.uk**), Colchester Zoo and Banham Zoo also have giraffe residents to visit. "Zoos have realised over the last decade that they're just not institutions that host animals for pure education purpose," says Dr Fennessy. "Many of them are trying to become more conservation-orientated."



Giraffe

Wars, environmental changes and poaching are just some of the challenges facing giraffe numbers

"Angelo has now reached the pinnacle of his lifespan and can watch as the next generation follows"

SAVING THE ICONIC RHINO

Discover the crucial action underway to rescue an animal whose evolutionary journey began over 50 million years before humans even walked the Earth

Battling extinction

As poaching spirals out of control, conservation groups work tirelessly to keep rhinos from creeping closer than ever to extinction

Of the 20 species of rhino that have ever existed, only five now remain. These horned mammals have been hunted throughout human history and have become an icon of conservation. Early humans butchered rhinos for their meat, and contributed to the extinction of the woolly rhino 10,000 years ago. As slow-breeding herbivores, rhinos have struggled to hang on to their position in the earth's ecosystem as the pressure from humans has intensified. Not only have they been slain for their meat, hides and horns, but their habitat has been claimed for purposes such as farming, logging and development of settlements.

Thankfully, the world is beginning to pay attention to the rhino's plight and charities across the globe continue working to prevent their extinction, as has been the case for decades. Members of private conservancies across Africa risk their lives to protect their critically endangered residents from illegal poaching. The introduction of rhino conservation laws in Nepal in 1957 has led to a population increase of 72 per cent in a single decade and the country has celebrated several zero-poaching years. The next steps include educating those involved in the illegal wildlife trade and developing technology to restrict their access to the animals. The future of rhino conservation is a challenging prospect and we can only hope the species will hold on long enough for the positive effects to take hold.

Last male standing

The two subspecies of white rhino are at opposite ends of the spectrum. While there are over 20,000 southern white rhinos alive today, as of 2014 there were only five northern white rhinos left on Earth. Sudan is the last remaining male. He is under 24-hour armed guard despite already having had his horn removed.

Black rhino
The pointed lips help black rhinos browse. This involves shredding leaves from trees and bushes rather than eating grass. Five of the eight subspecies are now extinct.

White rhino
The square bottom lip is characteristic of these grazing rhinos. They are the largest rhino species on the planet, with horns that grow up to 150 centimetres (five feet).

Indian rhino
Also known as the greater one-horned rhino, these mammals are at home living near water. Their folded skin looks like armoured plating, which helps regulate the animal's temperature.

Predicting the future of rhinos

Earth's remaining species of rhino are under threat of extinction by 2020. Where will these subspecies be?

Javan rhino

Javan rhinos exist in a single population in western Java, Indonesia. These rhinos have sharp lower incisors which are perfect for fighting. Females and even some males tend not to grow horns.

Sumatran rhino

Both the smallest and hairiest rhino species, the Sumatran rhino is the closest living relative to the extinct woolly rhino. Their hair keeps mud caked to the body to keep the animal cool and repel insects.

Black rhinos
If poaching continues at current record rates, black rhinos will be extinct by 2020. In 2014, 1,215 rhinos were poached in South Africa alone and these crimes resulted in only 386 arrests.

White rhinos
The last five northern white rhinos will probably die out before 2020, and if numbers of black rhinos dwindle, then poachers could target southern white rhinos to extinction.

Indian rhinos
Roughly 70 per cent of the Indian rhino population live in Kaziranga National Park in India, and if this habitat is compromised, the small, fragmented groups in Nepal may not recover.

Javan rhinos
With fewer than 100 animals left, the Javan rhino is in serious danger of extinction and could realistically disappear altogether by the year 2020.

Sumatran rhinos
Sumatran rhinos are likely to be extinct by 2020 because their habitat is being destroyed at an alarming rate and they are extremely difficult to breed in captivity.

Why is the rhino a species worth saving?

It's easy to overlook the impact a species has on its environment until it's gone. The extinction of the rhino would have devastating effects on its habitat

Rhinos are known as an umbrella species, meaning their presence affects all the organisms around them. One major impact they have is in providing nutrition for neighbouring species. Birds, insects and reptiles all flock to heaps of rhino poo to feed, either on the matter itself or the insects it attracts.

After a three-day journey through the body, the seeds in rhino dung are likely to be far away from where they were eaten. This dispersal promotes diverse vegetation growth, while the dung itself provides an excellent ready-made fertiliser. Removing rhinos from the ecosystem would be catastrophic.

LEFT
Brown-veined white butterflies feeding on dung in a rhino latrine

They open doors for others

Rhino landmarks help other species navigate the landscape by being so big

As large, powerful animals, rhinos create pathways for other animals when they move around. By charging through thick vegetation like a tank, a rhino opens up corridors for smaller animals, providing them with new areas in which to feed and rest. With skin 75 times thicker than human skin, rhinos can trample through thick or thorny vegetation without getting hurt. What's more, rhinos have been providing this service for 50 million years. The extinct hornless rhino species *Paraceratherium* stood at 5.5 metres (18 feet) tall and paved the way for elephants in Africa. The benefits of this action to elephants led them to out-compete *Paraceratherium*, which became extinct 20 million years ago.

Rhinos keep the landscape green

The more these giant herbivores eat, the more they help the surrounding environment

Unlike species like goats that strip away vegetation indiscriminately, rhinos feed selectively. They choose certain vegetation to eat to prevent dominant species from getting out of control. Rhinos leave a mosaic of different vegetation for other species to eat and promote diversity. Without this, fast-growing weeds could take over the landscape and destroy the plants other species rely on. Rhinos that feed on trees keep the plants short so smaller animals can reach them.

Their bodies provide food

Weighing up to 2,300 kilograms (5,000 pounds), a rhino carcass provides food for scavenging mammals. Hyenas, lions, wild dogs and vultures are known to scavenge on carcasses. Even when all the meat is gone, the remaining parts of the body feed insects and microbes. Over time, the decomposing animal fertilises the soil and enriches the area.

Rhinos locate water

The long list of the rhino's contributions to the ecosystem include finding new sources of water

In times of drought rhinos can dig for water. They can access groundwater by scraping mounds of earth away with either their feet or horns, choosing areas where water once stood, like dry river beds or water holes. Not only does this quench the thirst of the savannah's inhabitants, it provides them with protection from the sun. Many animals found in tropical areas rely on mud-wallowing to prevent sunburn. The water rhinos dig for helps create cooling mud to prevent their skin from getting damaged by UV rays.

Rhinos boost the economy

Not only do they attract tourists from across the globe, they also provide jobs for local people

Tourists hoping to see rhinos inject money into the local economy, making many countries better off. National parks and conservancies need staff to patrol areas, guide tourists and care for the animals. Many, like the Ol Pejeta Conservancy, provide financial support for local communities and contribute to the education and health of people in nearby towns. Rhino sighting companies operate in many parts of Africa, benefitting local communities. These facilities, which offer jobs and financial support, help reduce the risk of locals getting involved in poaching.

Action in progress

Three leading rhino charities that work tirelessly to keep rhinos safe from harm

Ol Pejeta Conservancy

This is the largest black rhino sanctuary in east Africa and is home to three of the remaining five northern white rhinos. The conservancy employs over 150 rangers, 32 of which are armed to deter poachers from attempting to access the animals.

The World Wide Fund for Nature

The WWF supports 12 African rhino conservation projects. They are helping to create new protected areas and expand those that already exist, as well as working with the Wildlife Trade Monitoring Network to crack down on poaching.

Save the Rhino

This organisation teams up with conservation projects across Africa and Asia to prevent poaching, educate local people about wildlife and reduce the demand for rhino horns. They fund the Education for Nature Vietnam (ENV) organisation.

1952

Anti-poaching measures are taken in Nepal to conserve the Indian rhino.

1977

The rhino horn trade is outlawed, meaning all future horn deals are illegal.

1992

Black rhino populations sink to 2,300, a 90 per cent decrease since 1970.

2010

The last Javan rhino in Vietnam is found dead with its horn removed.

All for a horn

Rhinos have been driven to near-extinction because their horn is wrongly thought to have medicinal properties

Keratin is the protein that's the key structural component of hair, fingernails and skin. It is found in the bodies of all mammals of the world, including in a rhino's horn. A Chinese medical book from 1597 named *Pen Ts'ao Kang Mu* states that rhino horn can help heal an enormous range of conditions, from typhoid to poisoning. Rhino horn is no longer approved for use in traditional Chinese medicine, but there is still a demand for the fabled miracle cure. Vietnam is now at the centre of the illegal rhino horn trade after a politician claimed rhino horn cured his cancer in the mid-2000s. This demand for horns has fuelled the poaching of thousands of rhinos across Africa and Asia. Local people are offered money to kill rhinos and hack off the horns. This involves sneaking into protected areas at night and often facing armed guards. The horns are then collected and smuggled onto planes headed for south-east Asia. On arrival, they can be chopped into pieces and sold on the black market.

Decline in rhino numbers from 2009-2015.

2011

The western black rhino is declared extinct, but the southern white rhino is recovering.

2014

Only one male northern white rhino remains alive and black rhino poaching figures break records.

Evading extinction

Many still hope for the future of the critically endangered northern white rhino, and emerging technology may be the answer

Richard Vigne is the CEO of the Ol Pejeta Conservancy. He spoke to us about the future of the last few northern white rhinos

Can the remaining northern white rhinos breed without human intervention?

"Sudan is now 42 years old, which is a pretty ripe old age. He's on his last legs and won't live forever, and he's probably now incapable of breeding. We're left with one old male who can't mate and whose semen is actually not particularly good quality. We still have two females, both of whom have reproductive issues. So natural mating in the remaining animals is not really a possibility."

Can the species still be saved?

"One option is to use stored northern white rhino semen, including semen from Sudan, to cross-breed with younger reproductively healthy southern white females. That would produce hybrids, which, if they were viable from a reproductive perspective, could be back-crossed with more northern white rhino semen over time, thereby creating, through many generations, almost pure northern white rhinos in the future at some stage. That's definitely an option that we'd explore."

Are there any other options?

"The other option is to do what is essentially *in vitro* fertilisation (IVF), which is exactly the same as what happens in humans. In other words, you take an egg, you fertilise it using semen from Sudan or stored rhino semen, and you create an embryo which can then be then implanted back into the womb. We wouldn't implant it into the womb of the existing northern whites because of the reproductive issues that they've got, so we'd use surrogate southern white rhino females to carry those embryos to produce pure-bred northern white rhino calves."

How realistic is that?

"The problem with all of this is that the technology to do this has never been developed in rhinos, so while it's been developed in humans and cattle and horses and various other species, it's never been done in rhinos. We've got to develop the actual process for doing that first before we can do it here. We've got to hope we can do it in time so it's ready before the remaining two females, who are carrying all the eggs, have died."

If the technology can't be perfected, what action can be taken?

"What could happen is we'll end up preserving DNA from northern white rhinos. In other words, northern white rhinos would cease to exist on the planet, except in the form of their DNA. It will be preserved in such a manner that allows it to be used through new emerging technology to create northern white rhino embryos at some stage in the future. It's called de-extinction. There are quite a few groups trying to do it now with various extinct species. The difference is they're working with old DNA from museum specimens. The advantage we have is we still have some live animals, so we can consider de-extinction."

ZEBRAS
STRENGTH IN NUMBERS

How the social structure of a tight-knit family wards off threats

Zebras are loyal and feisty and their social bonds help them to survive against even the most challenging of predators. To an outside observer, the creatures all look quite similar, but there are actually three distinct species, each with its own unique appearance, habitat and lifestyle. The plains zebra dominates the African savannah, amassing in herds thousands of animals strong during the wet season. The larger Grevy's zebra lives in the dry and dusty semi-deserts of Kenya, where groups travel for days on end in search of water. The portly little mountain zebras teeter in small clusters on hillsides, climbing to altitudes up to 1,000 metres (3,300 feet) above sea level.

Marwell Wildlife, in the United Kingdom, breeds all three species and has been heavily involved in Grevy's zebra conservation for the last ten years. In collaboration with University of Southampton, Marwell currently has a permanent research team based at the Lewa Wildlife Conservancy in Kenya.

We spoke with Katherine Edwards, one of Marwell's keepers, and University of Southampton student, Laura Pratt, to learn more about the zebras'social ties. "The plains and mountain zebra species form harems," Pratt explains. "In a harem, one male associates with a group of females and is the only one who gets to mate with them. Within these harem groups, hierarchies exist among the females, but the stallion is usually the top animal."

Stallions without a harem collect in bachelor groups and must work to earn females, either by challenging an established male, or building up a family from scratch by attracting foals. However, once a stallion has won his prize, he becomes a dedicated leader and an attentive father. The male will go to great lengths to protect his family, slowing the pace of the group so young foals can keep up and always being on the lookout for rivals.

Herds of zebra might appear chaotic and completely disorganised to the casual observer, but in among the

sea of stripes strict order is constantly being maintained. Herds only come together briefly and if harems lose track of one another, the consequences could be grave. To avoid losing one another the females follow a strict hierarchy and move together as a group. The lead mare takes the front position, while the others in rank order follow behind her. The stallion brings up the rear, keeping a close eye on the whole herd.

This intricate hierarchy is based on the order in which each zebra joined the group, with those higher in rank getting access to the best grazing. They are also allowed the first drink at the watering hole, with the lower-ranked individuals following in respectfully.

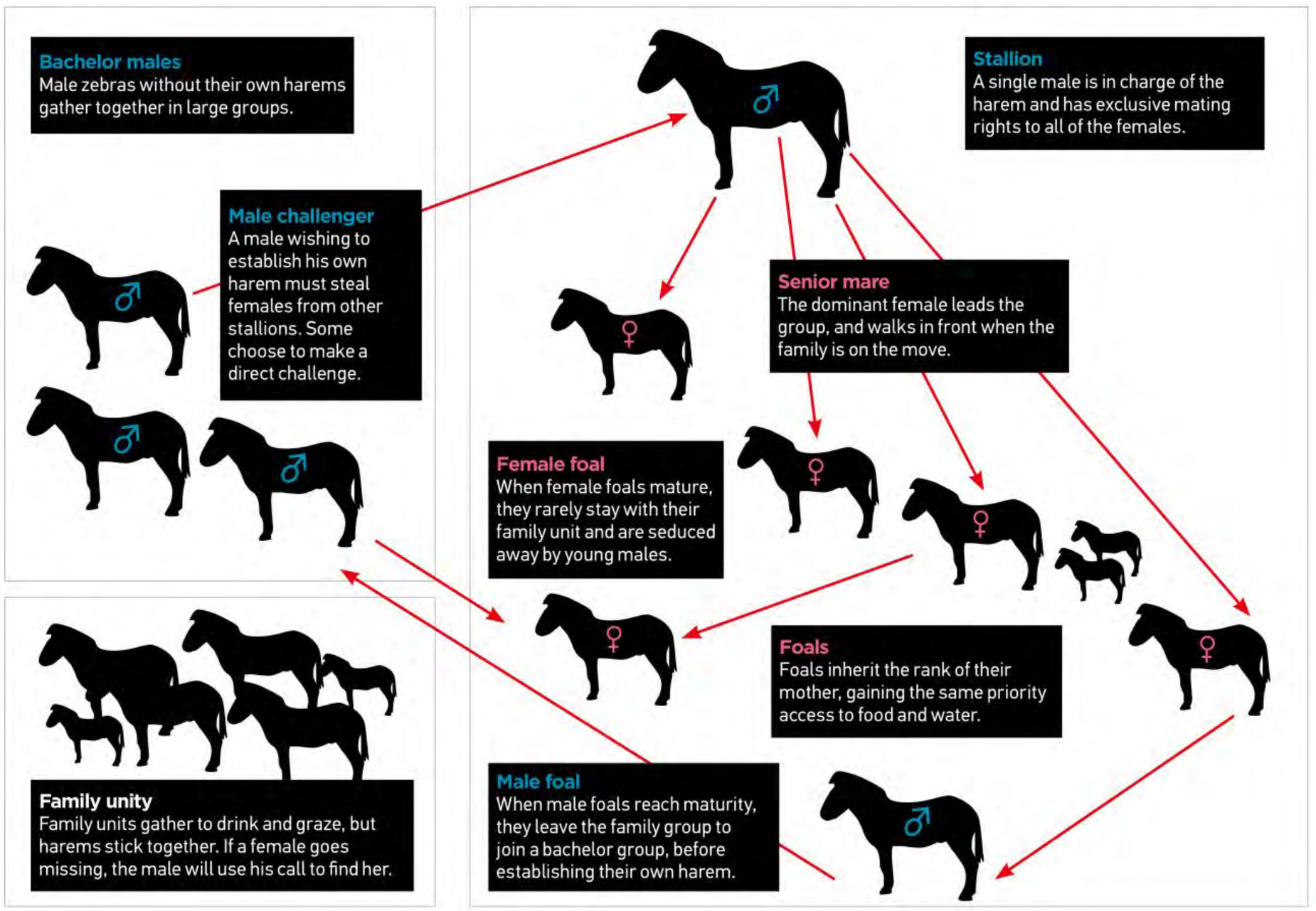
At Marwell, there are four Hartmann's mountain zebras, but even in such a small group the struggle for dominance is very apparent. As a zookeeper, Edwards regularly spots conflict. "Our two youngest females don't get on and most of the fighting happens because one of them wants to move up in the hierarchy," she explains. "It does switch occasionally, if one of them isn't feeling great, or is having a bad day, and then it will switch back again once they've had another altercation."

This kind of social pecking order might seem unfair on the lowest-ranked individuals, but it's an efficient survival strategy. Zebras inhabit environments where food and water are relatively close together, even during the dry season. This means that females do not always need to compete for resources and can band together under a common cause; by living under the protection of a single dominant male, groups of females maximize their chances of raising their young to adulthood.

Unfortunately not all zebra species are lucky enough to live in areas with such plentiful food and water. The

Life in the harem

Run by a single alpha male, the societal laws of zebra communities makes for the strongest bonds on Earth



Grevy's zebra is the largest of the three species, and lives in an arid landscape where water sources can be days apart. While working on the project, Pratt spent time in Kenya observing the behaviour of these adaptable animals. "Grevy's zebra have a reasonably fluid social structure," she explains. "The groups are not fixed in size; larger aggregations of individuals tend to happen at night, and then they disperse more during the day.

Resources are far apart and although these large zebras are able to go several days without water, they need to keep moving if they want to find food. When a female gives birth to a foal, however, it's more difficult for her to travel. Especially when they are newly born, foals cannot walk too far and must remain within half a day's distance of water. This scenario would put a plains zebra stallion in a difficult position – he would be risking the survival of the entire harem by stopping to allow the foal to drink – but Grevy's males have a different strategy.

Instead of forming a permanent family, these stallions secure a large territory close to a water source. The best spots are defended vigorously, and as the females move through in search of food or water for their young, the male seizes the opportunity to mate. While in Kenya, Pratt witnessed this behaviour: "Territorial males will mate with any female entering their territory and will chase off any other males. I saw one individual chase a young juvenile male out of a female group we were observing – a rather abrupt end to his childhood with mum!".

In captivity the laid-back social structure of the Grevy's is evident, but without the pressures of the harsh African environment, the animals are able to enjoy one another's company long-term. Keeper Edwards says that the animals are a bit of a handful at Marwell. "The Grevy's zebras are actually remarkably calm all of the time, but they are very naughty – they always try to go where they're not allowed," she explains. "When they go out, we have to make sure that the gate to the waterbuck house is shut first, because if it's not, they will sneak in."

Zebras are tough, adaptable, sociable animals, and their stripes are icons of the African savannah. Thanks to the continued work of African wildlife conservation efforts, steps taken to help protect the zebras and their precious family bonds.

Stripes of the savannah

How each individual zebra's unique pattern helps it blend

Optical illusion
Stripes in the herd blur the outline of individuals making it more difficult for predators to focus on one animal and hunt it down.

Unique stripes
Even within the same species, the actual stripes vary greatly between individuals, and are as unique as a human fingerprint.

Distinctive patterning
The plains zebra, in particular, have very wide and widely spaced stripes, and often have shadow stripes in between.

Outline disruption
The striped colouration of the zebra might seem conspicuous, but in the shade the stripes mimic the shadows cast by the sun.

> "The Grevy's zebra is the largest species and lives in an arid landscape"

Rival males will often fight during the mating season to establish dominance

Because foals initially run at a much slower pace, adults will often slow down to protect their vulnerable young

BELOW When grouped together, the iconic stripes become doubly effective, obscuring and distorting the herd

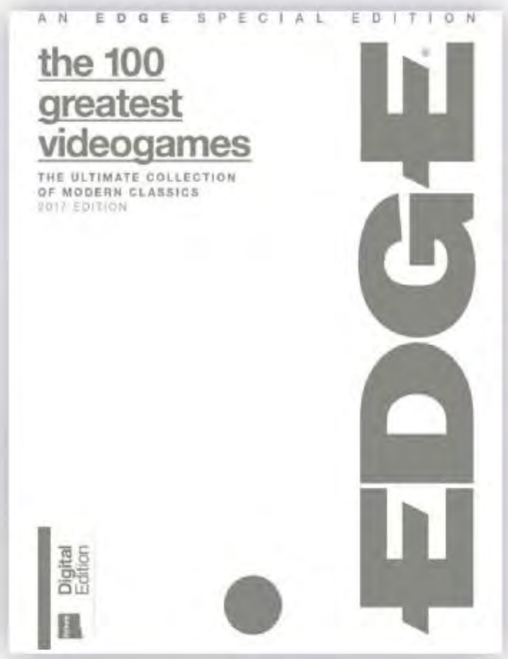
SUBSCRIBE AND SAVE UP TO 74%

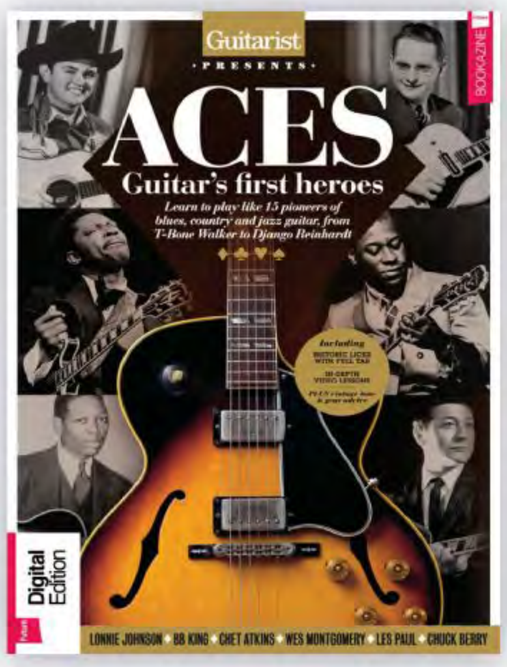
Every issue of your subscription, delivered direct to your door. Print & digital editions available.

NEAT STORAGE

Store up to 13 issues of your magazine subscription in a coordinating slip case or ring binder.

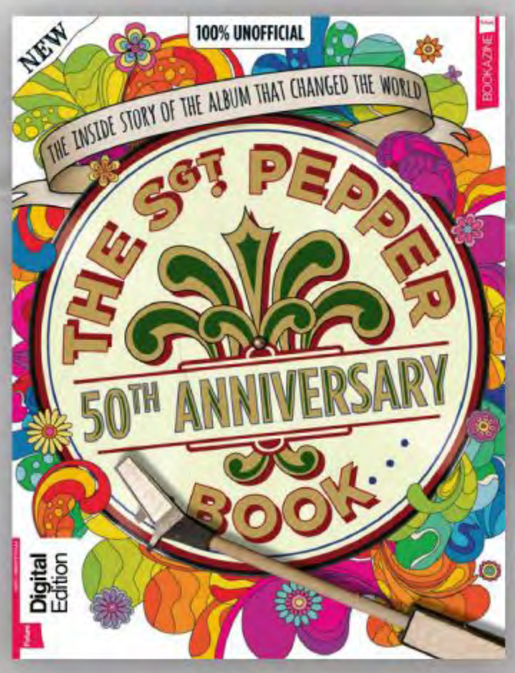
myfavouritemagazines.co.uk





DISCOVER MORE GREAT GUIDES & SPECIALS

From photography to music and technology to field sports, there's something for everyone.

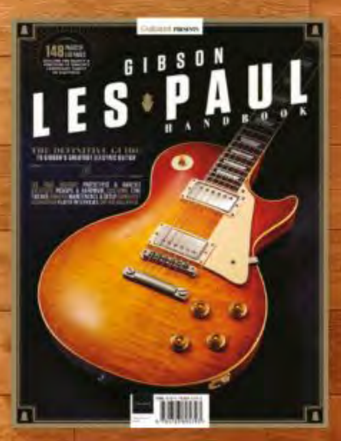


No hidden costs | Shipping included in all prices | We deliver to over 100 countries | Secure online payment

FUTURE

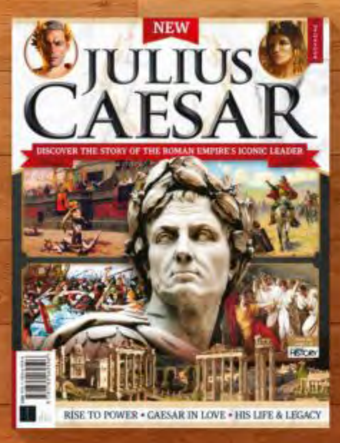
myfavouritemagazines
Official Magazine Subscription Store

myfavouritemagazines.co.uk



Discover another of our great bookazines

From science and history to technology and crafts, there are dozens of Future bookazines to suit all tastes



Get great savings when you buy direct from us

1000s of great titles, many not available anywhere else

Worldwide delivery and super-safe ordering

FUTURE

www.myfavouritemagazines.co.uk

Magazines, back issues & bookazines.

World of Animals

BOOK OF

BIG CATS & AFRICAN WILDLIFE







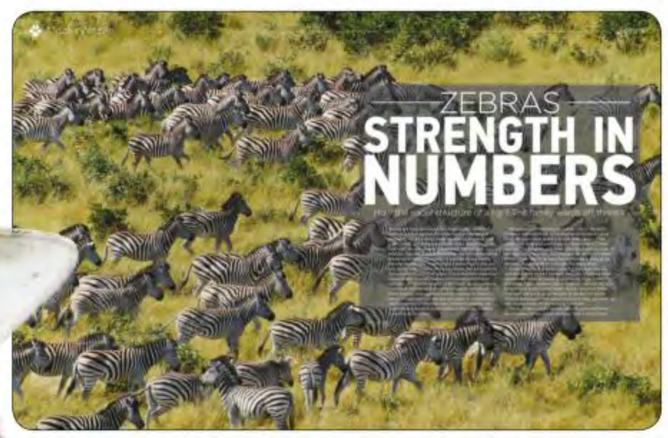



CLASSIC BIG CATS

Meet the charismatic animals such as the African lion that have made big cats so iconic

MYSTERIOUS FELINES

Discover the rarest and most secretive of cats, from the Eurasian lynx to the Amur leopard



AFRICAN WILDLIFE

Find out about the wide diversity of animals across the continent of Africa

JOURNEY TO KENYA

Join us in a safari across Africa's savannahs, and discover the animals that call it home