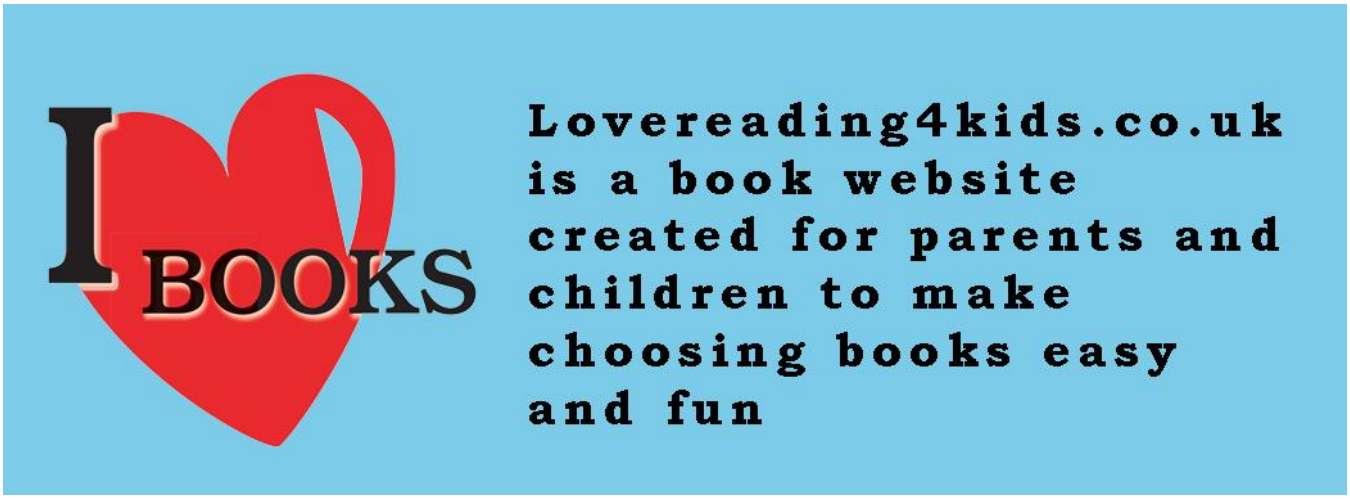

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The Curiositree: Natural World: A Visual Compendium of Wonders from Nature

Written by

Aj Wood, Mike Jolley, Professor Amanda Wood & Owen Davey

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A Visual COMPENDIUM *of Wonders from Nature*

NATURAL WORLD

By Amanda Wood & Mike Jolley · Illustrated by Owen Davey

Wide Eyed Editions

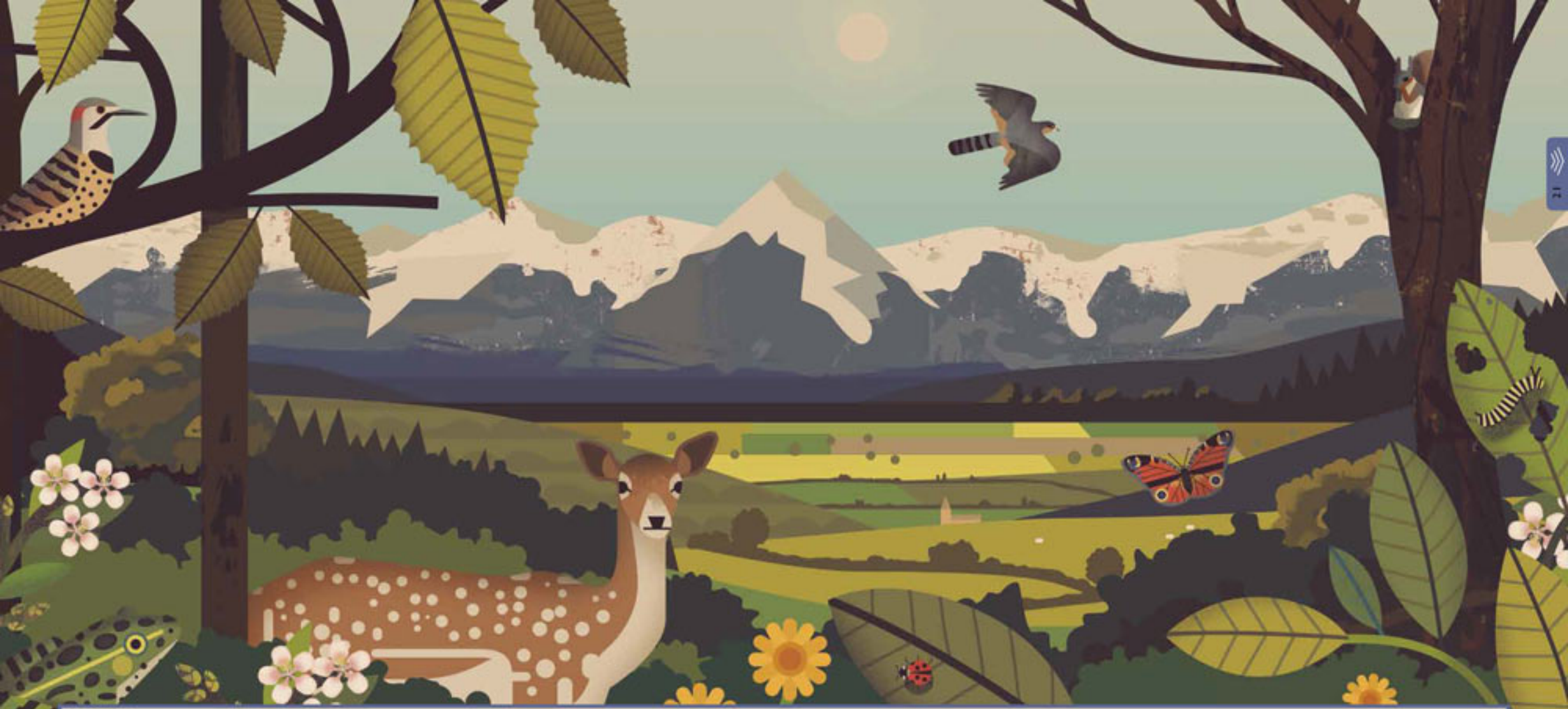


CHART No.6

THE FIGHT F OR SURVIVAL

IN THE NATURAL WORLD EVERYTHING HAS A PURPOSE. The colourful feathers of a male bird of paradise are there to help him attract a mate, the shape of a guillemot's egg is designed to stop it rolling away off the edge of a cliff, the patterned wings of a butterfly helps it frighten away predators – everywhere you look, living organisms have adapted and evolved, whether in appearance or behaviour, to maximise their chances of survival.

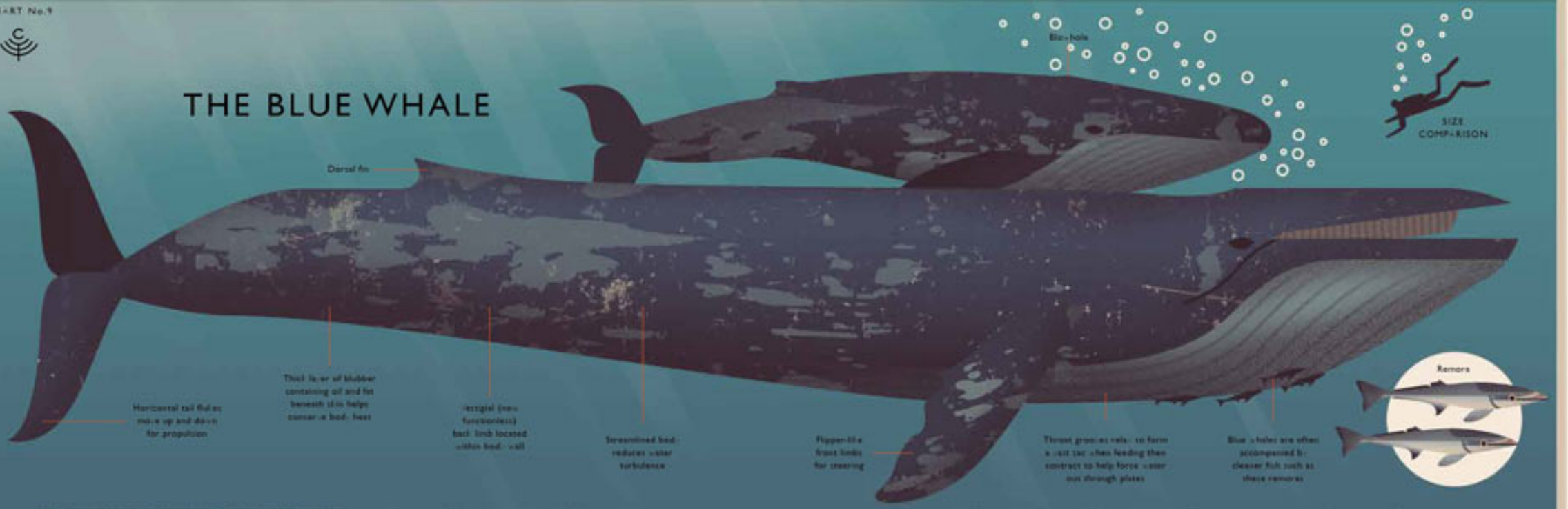
Over many generations these adaptations have come about through small variations that have allowed one living thing to compete better for survival than another. As an example, the giraffes with the longest necks can reach the most food so are more likely to survive when food is scarce and go on to produce long-necked offspring of their own.

Adaptations that help living things survive can take a number of forms – physical, (such as an animal's shape), behavioural (such as the ability to use tools) or physiological (such as the ability to make venom). Over time, they can help an animal survive in more challenging environments with little food and harsh climates, such as deserts or mountaintops.

Plants too have adapted to increase their chances of survival, from the cacti's ability to store water, to the myriad ways in which plants spread their seeds. Nowhere can nature's ingenuity be seen more clearly than in the fight to survive.

CHART No.9

THE BLUE WHALE

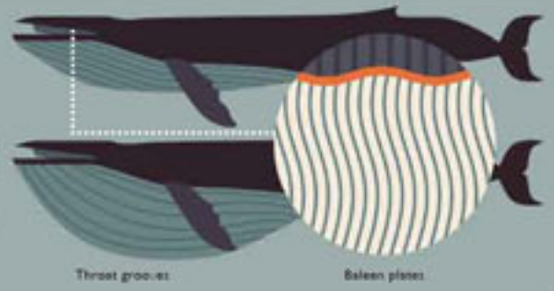


NOT ONLY IS THE BLUE WHALE THE LARGEST LIVING CREATURE – IT IS THE BIGGEST ANIMAL EVER TO HAVE EXISTED ON EARTH. Despite its superficially fish-like appearance, it belongs to a class of mammals known as **cetaceans** that includes whales, dolphins and porpoises.

- A fully-grown adult whale can reach over 33 metres in length, longer than three double-decker buses.
- It is one of the most specialised of all mammals with its fish-shaped body and flipper-like front limbs, and is an example of a **baleen whale**, named after the hundreds of horny (baleen) plates found on either side of its upper jaw. It uses these to sieve thousands of tiny planktonic crustaceans, such as krill, from seawater.
- Like all true mammals, the blue whale is warm-blooded and it gives birth to a single calf that it then suckles for six to eight months from teats hidden in a pouch in its body.
- A whale calf may be as long as 7 metres at birth and will drink over 400 litres of its mother's milk every day until it starts to feed for itself.
- A migratory species, blue whales are found in all of the world's oceans. They feed in the Arctic and Antarctic during the summer when krill are plentiful and move to tropical water to breed during the winter.
- They communicate through a series of grunts, moans and hums and can make the loudest sound of any animal, echoing through the ocean at 180 decibels.
- Whales breathe through nostrils known as **blowholes** on the top of their heads. Strong muscles keep these closed when the whale is underwater, opening when the whale surfaces to explosively release air from its lungs before taking another breath.

FEEDING

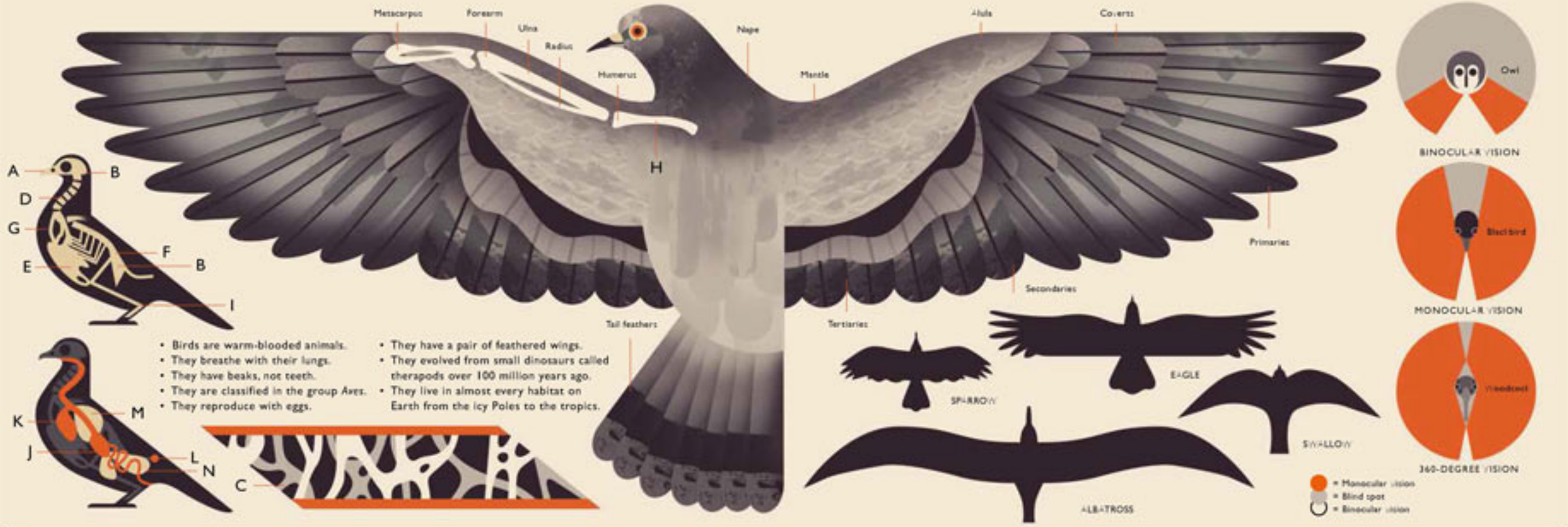
To feed, the blue whale gulps a huge mouthful of seawater, expanding its lower jaw into a giant bag that can hold more than 90 tonnes of food and water. This food sticks to fine bristles on the baleen plates when the water is expelled. It is estimated that a blue whale can eat as many as 40 million krill in a single day!



TOOTHED WHALES

The remaining members of the cetaceans are the **toothed whales** – the dolphins, orca and porpoises as well as the sperm, white and beaked whales. Toothed whales make up almost 90 per cent of living cetaceans and all possess teeth rather than baleen plates, often housed in a long beak-like snout at the front of the head.

WHAT IS A BIRD?



- Birds are warm-blooded animals.
- They breathe with their lungs.
- They have beaks, not teeth.
- They are classified in the group *Aves*.
- They reproduce with eggs.
- They have a pair of feathered wings.
- They evolved from small dinosaurs called therapods over 100 million years ago.
- They live in almost every habitat on Earth from the icy Poles to the tropics.

STRUCTURE OF A BIRD

BIRDS COME IN ALL SHAPES AND SIZES, from the world's smallest, the bee hummingbird, which weighs 1.6 grammes, to the African ostrich, which, at 125 kilogrammes, is our largest living bird and nearly 80,000 times heavier than its tiny relative! The basic structure of most flying birds is quite similar, though. Typically, they are a sleek and streamlined shape, which helps them to use as little energy as possible as they move through the air, and short, strong, compact bodies. Each has:

A. **Horny beak** – Much lighter than a mouthful of teeth!
B. **Fused bones** in its skull, pelvis and other parts of the body for extra strength.
C. **Honeycomb bones** – Many of a bird's major bones are hollow with a network of supportive internal struts. This helps to make a bird's skeleton lightweight but strong.
D. **Flexible neck** – Aids feeding, preening and all-round vision.
E. **Breastbone or keel** – A bird's powerful flight muscles attach to this. Overall, birds have 175 different muscles, which are used to flap the wings, are the largest.
F. **Pelvic girdle** – Strong and rigid for take-offs and landings.
G. **Wishbone** – A bird's collarbones are joined to keep its wing joints in position.
H. **Wing bones** – These are made up of the humerus, radius, ulna, forearm and metacarpus.
I. **False knee** – Although it may look as if a bird's knee is bending back to front, this is actually a bird's ankle. Its knee is at the top of its lower leg bone, hidden by its feathers.
J. **Gizzard** – Instead of teeth, this muscular bag is used to grind up food. A bird will swallow small stones, which also help.
K. **Crop** – A storage bag for food.
L. **Preen gland** – A bird covers its feathers with a waterproof oil that comes from here.
M. **Lungs** – A bird can take in lots of oxygen, which allows them to fly up high in the sky where oxygen is scarce.
N. **Air sacs** – These help to pump air through the respiratory system.

WING SHAPES

The shape of a bird's wings can tell you a lot about their style of flying.

Sparrow
The sparrow has short, rounded wings for quick take-off and good manoeuvrability in the air – useful if you're trying to escape a hungry hawk!

Eagle
Large soaring birds, like eagles and buzzards, have broad wings. Long flight feathers that splay out like fingers on a hand give them extra lift as they soar on upward air currents called thermals.

Swallow
Fast flyers like the swallow have pointed, backswept wings, which help them to swoop and dive at great speed while taking as much energy as possible.

Albatross
Gliding birds such as the albatross have long, narrow wings which allow them to soar and glide over the ocean for days – or weeks! – at a time.

BIRD VISION

Over time, the position of a bird's eyes has adapted to its lifestyle.

Binocular vision
Predatory birds, like owls, have eyes at the front of their heads. The view from each eye overlaps, giving the owl three-dimensional vision that helps it to track prey.

Monocular vision
Birds that are hunted, like blackbirds, have eyes nearer the sides of their heads. This gives better all-round view but less binocular sight.

360-degree vision
With eyes even further round the sides, woodcocks can see behind their heads!

DESERT LIFE

DESERTS MAY BE SHORT ON WATER, BUT THEY'RE NOT SHORT ON WILDLIFE. The only way to survive in this extreme climate is through evolutionary adaptation and many creatures have successfully done just that.

- Africa's Sahara Desert is the single largest hot desert on Earth – at over 9 million square kilometres.
- In summer the daytime temperature can soar to 47°C, often for several months at a time. There is less than 10 centimetres of rain per year, even less in the central areas, and hurricane force winds often cause punishing sandstorms and dust devils (a type of whirlwind).
- The wildlife that lives here has adapted to these hyper-arid conditions in a variety of ways. In the heart of the desert, most mammals are relatively small to help minimise water loss and often meet their need for water just from eating food. Some may never drink water in their entire lives. Many take refuge in burrows during the heat of the day and forage at night when it is cooler. Others have physical adaptations to help them cope with this harshest of climates.

A. **Dromedary camel** – An expert at water storage, this camel can drink over 50 litres in just a few minutes, and then go for days without drinking at all. Contrary to popular belief, its hump is used for storing fat, not water, which enables it to go for long periods without eating, and its particularly long large intestine helps absorb every last bit of water and nutrient from its food.

B. **Fennec fox** – With a sand-coloured coat that blends in with its desert background, this hunter looks for small mammals, birds and insects. Its large ears help it to lose body heat and allow it to hear prey beneath the ground. Fur on the base of its feet protects it when walking over the burning hot sand.

C. **Addax** – Also known as the screw-horn antelope, this animal can survive without drinking water for long periods, instead getting moisture from its food and from the dew that condenses on desert plants. It expertly tracks rainfall and will journey across the desert in search of plants that spring up quickly wherever rain falls. Its pale coat reflects the sun's rays, helping it to keep cool, and its oversized hooves make it adept at walking on the desert sands.

D. **Desert jerboa** – This rodent – related to rats and squirrels – comes out only at night from its burrow beneath the sand. It rarely drinks water, extracting moisture from its diet of desert plants and insects.

E. **Sandfish lizard** – This type of skink 'swims' through sand to escape the heat – and other predators! It has shiny scales, fringed feet for burrowing and tiny nostrils to keep sand out of its nose and lungs.

F. **Horned viper** – This snake burrows itself in the sand to catch passing prey, where its patterned scales blends in perfectly with its background. It can travel fast over loose sand by weaving its body from side to side, a form of locomotion known as sidewinding, which leaves a distinctively patterned track in its wake.

G. **Desert scarab beetle** – This species of dung beetle gets all of food and water from the dung it collects. Pairs of beetles will roll and bury a ball of dung as a food store and in which they lay their eggs.

H. **Date palms, tamarisks** and **acacias** – There are few plants in the heart of the desert, but where there are springs, an oasis – or wadi – will form. Here, specialised trees and shrubs will grow, their long roots reaching down to reach precious water far below the desert sands. When rain does fall, the seeds of flowering plants sprout very quickly, completing their growth cycle and producing new seeds in a matter of days before the soil dries out again.