Birds

Section 1: Characteristics of Birds

• What are the advantages of having feathers?

All birds have feathers. Feathers serve many purposes and have become incredibly varied across different bird species. Birds are warm-blooded animals, and they use light-reflecting pigments in their feathers to help stabilise their internal temperature. For birds that fly, tail feathers can help control direction and adjust balance. For birds that swim, feathers can create a waterproof layer. One of the most striking uses of feathers is during mating rituals. The males of many bird species use their plumage to attract a mate and intimidate rivals.

- **Suggested Film**
  - **What is a Bird?**

Extension Question

Q1. What are feathers made of?

Bird feathers are made of a protein called keratin. The same protein is present in beaks and claws. Human hair is also made of a similar substance, but the keratin in feathers has special molecular features that make feathers stronger and more resilient.

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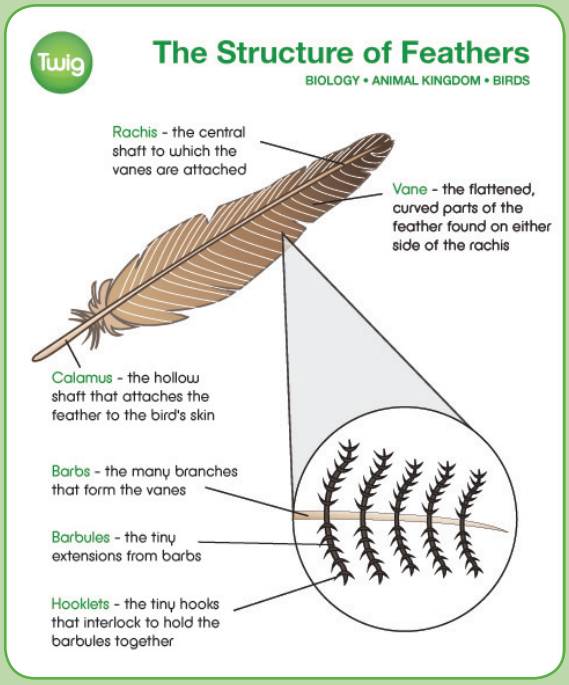

• How are birds' bodies adapted for flight?

Most birds are able to fly. They power their wings using enlarged pectoral muscles, which often make up a significant proportion of their weight. To help reduce their overall weight, birds' bones are hollow, creating a skeleton that is lightweight but strong. Birds also have a special forked bone called a furcula or wishbone, which protects the vital organs in their chest cavity during flight.

- **Suggested Films**
  - **How Did Birds Evolve?**
  - **Albatross**

Extension Question

Q2. How do birds breathe?

The intense activity of flying means birds have a high demand for oxygen. Rather than having a diaphragm to draw air in and out of lungs, a bird's respiratory system only allows air to flow in a single direction. This avoids the mixing of fresh and stale air that occurs in mammalian breathing, making their oxygen uptake more efficient.

• How do birds reproduce?

All birds reproduce by laying eggs. After fertilisation, the female deposits the eggs in a nest where they must be incubated until they are ready to hatch. The size of a bird's clutch (i.e. the number of eggs it lays in a single period) varies significantly from one type of bird to the next. Some birds, like the albatross, lay just one egg at a time, whereas other, smaller birds may lay up to 20. Birds take great care to ensure their eggs are kept at just the right temperature for the developing chicks inside, either using their own body heat or creating intricate nests.

All birds reproduce by laying eggs.

• Suggested Films

- **What is a Bird?**
- **Malleefowl**

Extension Questions

Q3. What is the purpose of an eggshell?

Bird eggshells are made of calcium carbonate. This creates a hard coating that protects the developing embryo from damage and infection. The egg contains all the nutrients the developing chick will need, and the shell holds in moisture to prevent the egg from drying out. In addition, the chick requires oxygen, so eggshells are designed to allow gas exchange to take place with the surrounding environment.

Q4. Why do some birds mate for life?

Some species of bird are known to reproduce with the same mate for many seasons. This level of monogamy is unusual in the animal world, but it has several potential benefits. A long-term mate can free up birds to defend larger territories, and provide more support when raising young.

Section 2: Moving Around

• How do birds use their wings to move around?

Although most birds can use their wings to fly, there are some that spend almost their entire lives in the air. Albatrosses can fly for long periods without stopping, covering 1000 kilometres in a single day and not setting down on dry land for years at a time. Their huge 3-metre wingspan enables them to take full advantage of updrafts created by waves and cliff faces. This means they don't have to flap their wings very often, reducing the amount of energy used during flight. The only reason an albatross returns to land is to reproduce.

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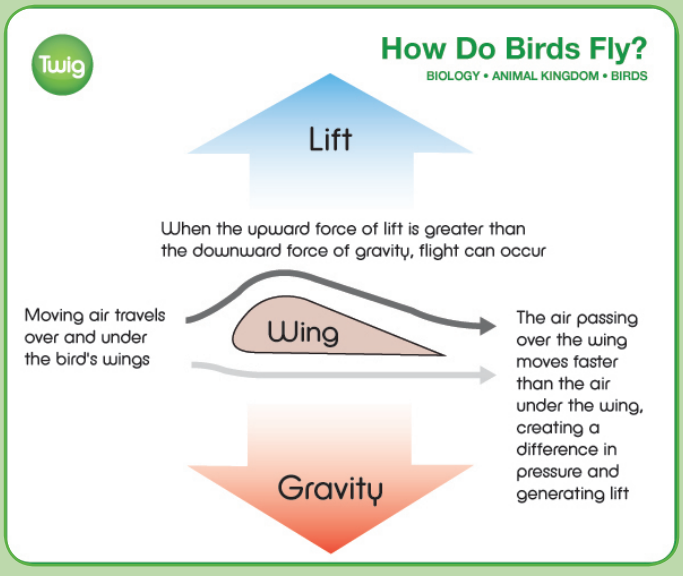

• Suggested Film

– Albatross

Extension Question

Q5. What is the fastest bird?

In the air, the fastest bird is the peregrine falcon. Its aerodynamic body lets it reach speeds of over 320 kilometres per hour during hunting dives, enabling it to catch its prey by surprise. On land, the fastest bird is the ostrich. The ostrich is the tallest and heaviest of all bird species. Ostriches can reach top speeds of over 70 kilometres per hour, and are able to maintain a steady jog of almost 50 kilometres per hour.

• How do birds use their feet to move around?

Roadrunners are part of the cuckoo family, and spend virtually their entire lives on their feet. They have evolved to be fast runners, reaching speeds of up to 30 kilometres per hour. This adaptation helps them to chase and catch prey such as insects, small reptiles, rodents, and small birds. Other types of bird use their feet to wade through water in search of food, or to climb along tree branches.

• Suggested Film

– What is a Bird?

Extension Question

Q6. Why don't penguins' feet freeze?

Penguins spend about half their life stood on ice and snow-covered ground. They don't have any feathers or blubber on their feet to provide insulation, and yet their feet never freeze. This is because penguins have a special counter-current heat exchange system, which reduces the amount of heat lost to their environment. When warm blood flows down to a penguin's feet, it passes over cold blood that is flowing the opposite direction. The warm blood transfers some of its heat to the cold blood, which keeps more of the warmth inside the penguin's body. Conserving heat in this way prevents its feet from freezing, no matter how cold it gets.

• How do birds move around in water?

Many birds live on or around water. Swans, ducks and geese have large flat feet that they use to paddle across the surface of ponds and lakes. Seabirds like gannets and cormorants have streamlined bodies that enable them to dive smoothly into the water to hunt fish. Penguins are strong and agile swimmers, and have become so adapted to life in the water that they have lost their ability to fly. Their wings have evolved into flippers, and their smooth plumage traps a layer of air, insulating them from the cold waters. Their plumage is countershaded to provide camouflage: white patches on their fronts helps them hide from predators looking up from beneath, and dark patches on their backs help them hide from predators looking down from above.

• Suggested Film

– What is a Bird?

Penguins are strong and agile swimmers.

Section 3: Feeding

• How have birds adapted to be predators?

The great grey owl has forward-facing eyes that give it excellent binocular vision.

Some bird species are fearsome predators, from the peregrine falcon and its high-speed dives, to the bald eagle with its powerful talons. The great grey owl is a highly adapted bird of prey. It has forward facing eyes that help it to judge distance, and highly sensitive hearing that allows it to pinpoint the location of prey, even from beneath 10 centimetres of snow. Soft, serrated flight feathers mean they can silently glide into a perfect hunting position, and sharp talons enable them to tightly grasp their prey.

• Suggested Film

– Great Grey Owl

Extension Questions

Q7. What are the advantages of hunting by sound?

Relying on sound rather than sight allows predatory birds such as owls to locate prey that would otherwise be hidden – for instance, animals that are tunnelling under snow or hidden beneath leaf litter. It also means that they can hunt at night when it is dark.

• How have birds adapted to feed from plants?

Lots of birds feed from plants, and have evolved a variety of adaptations to help them do so. The beaks of finches, for example, are specialised to crack open nuts and seeds. Hummingbirds feed largely on nectar from plants. In order to extract this sugary liquid from delicate flowers, hummingbirds have evolved the ability to hover in mid-air. Their wings are able to flap 50 times per second, and by making minute adjustments they can hover, fly backwards, and even fly upside down. The high-energy demands of this type of flying mean their hearts beat more than 1000 per minute. They also have to enter a hibernation-like state overnight to conserve energy.

• Suggested Film

– Marvellous Spatuletail

Extension Question

Q8. What did Darwin learn from studying the Galapagos finches?

During his visit to the Galapagos Islands in the Pacific Ocean, Darwin noticed that each of the native species of finch had a different size and shape of beak. He concluded that each species had adapted to suit a different food source. It was this example of adaptation that helped Darwin piece together the theory of evolution.

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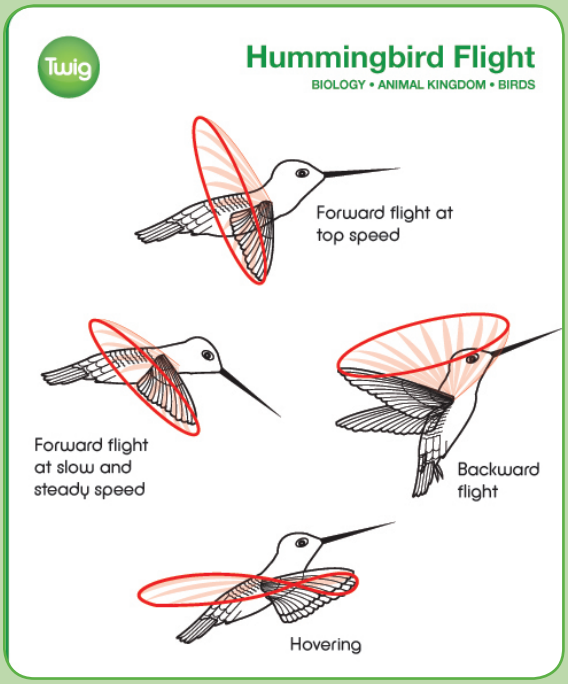

• How have birds adapted to be scavengers?

Andean condors scour the landscape for food.

Andean condors feed on carrion – the decaying flesh of dead animals. They search for food from the air, flying over the landscape and looking for signs of a potential meal. They conserve energy by gliding on strong updrafts, and can spot carrion from many kilometres away. Their formidable size helps them to scare away any other scavengers competing for food, allowing them to claim the dead animal for themselves.

• Suggested Films

– Andean Condor

Extension Question

Q9. Why do scavengers not get ill from eating rotting carcasses?

Animals that survive on carrion typically have very strong stomach acids. This kills any bacteria growing in the rotting animal flesh they consume. Their digestive systems are also straighter, reducing the number of folds and spaces in which bacteria can collect and multiply.

• Quizzes

What is a Bird?

Basic

• How many species of bird are there in the world?

A – 3000

B – 9000

C – 15,000

D – 50,000

• Which one of the following BEST describes birds?

A – birds are warm-blooded vertebrates

B – birds are cold-blooded vertebrates

C – birds are warm-blooded invertebrates

D – birds are cold-blooded invertebrates

• Which one of the following birds cannot fly?

A – penguin

B – puffin

C – heron

D – robin

• Birds are bipedal, which means they...

A – can wade through water

B – have two feet

C – reproduce by laying eggs

D – maintain a constant internal temperature

Advanced

• Which of the following features do mammals share with birds?

A – they both have hair

B – they both have a diaphragm

C – they are both able to keep a constant internal temperature

D – they both have mammary glands

• Which characteristic do all birds share?

A – they can fly

B – they have feathers

C – they have vividly coloured plumage

D – they lay over 10 eggs per clutch

• Which one of the following birds cannot fly?

A – owl

B – flamingo

C – emu

D – nightingale

• Which of the following statements is NOT true?

A – birds are vertebrates

B – birds are warm-blooded

C – birds lay eggs

D – birds are quadrupedal

How Did Birds Evolve?

Basic

• Which of these characteristics did the theropods NOT share with modern birds?

A – a lightweight beak

B – bipedalism

C – feathers

D – hard shelled eggs

• What is the most likely reason that feathers first evolved?

A – for insulation

B – to aid in flying

C – for camouflage

D – for protection against parasites

• What did theropods have instead of beaks?

A – a cloaca

B – a proboscis

C – a soft mandible

D – toothed jaws

• Which of the following was one of the largest theropods?

A – archaeopteryx

B – spinosaurus

C – diplodocus

D – triceratops

Advanced

• What feature suggests that microraptors may have been able to glide?

A – a highly-developed brain

B – a long tail

C – aerodynamic feathers on legs

D – large flight-muscles

• Which of these body features needed to change to enable flight?

A – eyesight

B – nervous system

C – digestive system

D – skeleton

• How might feathers have helped theropods reproduce?

A – they helped with egg incubation

B – they increased fertility

C – they stored nutrients

D – they disguised the theropods' nests

• What did epidexipteryx use its tail plumes for?

A – luring prey

B – threatening rivals or attracting mates

C – flying

D – staying warm

• Answers

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