STEPHEN MOSS

DO BIRDS HAVE KNEES?

ALL YOUR BIRD QUESTIONS ANSWERED

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BLOOMSBURY

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INTRODUCTION

Questions are a way of focusing our interest, but finding answers can be frustrating. Havin spent much of my life fielding other people's questions about birds, I had long yearned for a easy reference source that provided all the answers in a single place. Hence the simp question-and-answer format of this book, which allows any reader to get straight to th answer they want without becoming swamped by information they may not need.

I began the compilation process by collecting 'raw' questions from a broad spectrum people, including friends and family, beginners and experts, and the staff of my publisher Bloomsbury. Some were fascinating, some ludicrous and some frankly unanswerable, but a played their part in revealing the kind of things that people would like to know about birds. you were part of this process, I hope you will find your answer here – and, with luck, a lot mor besides.

The questions – more than 500 in total – are arranged in ten chapters, each tackling a majo theme, such as feeding, breeding or migration. A comprehensive index helps you locate an question you want answered. Having done so, I hope you will be drawn further in, findin equally interesting answers on related topics, or simply reading onwards to gain a deepe insight into a particular subject.

Humming birds feed on nectar

During the book's compilation I used a number of reference books in order to finalis questions, check facts and glean ideas. Of these, the most important were those listed in th bibliography by Bird, Brooke & Birkhead, Campbell & Lack, Clements, Leahy, Todd an Weaver. All published 'facts' were checked against at least two further sources, usually more.

Emperor Penguins with chick

You will find the text liberally sprinkled with headlined boxes containing little nuggets o information. These are what I call 'record breakers', and list superlatives such as the bigges smallest, highest, fastest and so on. Being records, they are subject to certain qualification some, such as those concerned with longevity, may already have been surpassed by the tim this book has hit the shelves; others have their absolute accuracy open to question. Mar simply reflect what has been measured or studied to date, which means they are by no mean the final word on the subject. Facts and statistics – especially those related to the late scientific discoveries – often show a distinct bias towards European or North America species, simply because this is still where most research takes place. Where there is an measure of doubt, I have couched the information in suitably non-committal terms, such a 'probably', 'it is claimed' etc. If you do discover a newer or more accurate record, please l me know (via the publishers), and I'll be happy to include it in any future editions.

So who exactly is this book for? My long-time friend and birding companion Daniel Oso gave me a typically backhanded compliment when he said that it would appeal to intelligen enquiring 11-year-old boys – the same as he and I were when we first met. I hope that it w also appeal to 11-year-old girls, since there are far too few women birders, and this might ju spark an interest that helps redress the balance. Ultimately, however, I would like to think tha the book has something to offer to all ages and that it is equally suitable for experience

birders, complete novices and anyone in between.

Most of all, I hope that you enjoy reading it, and that you are motivated to go out into th field and look anew at birds – which, to my mind, are the most elegant, fascinating an delightful of all creatures.

Physiology

ANATOMY

What is a bird?

A bird is a warm-blooded, egg-laying vertebrate (animal with a backbone). It has a boc covered with feathers, and forelimbs modified to form wings. Technically speaking, birds ar all members of the class Aves.

What makes birds unique?

In a word: feathers. This is the only characteristic unique to birds. Mammals are also warn blooded, some reptiles and two strange mammals also lay eggs, and bats and some insec can also fly. No other creature has evolved feathers, but all birds – even flightless ones such a Ostriches and penguins – have them.

All birds – including this Black Kite – have feathers

Are birds warm-blooded?

Yes, just like mammals, birds are 'warm-blooded' or homeothermic. This means they can (an

must) maintain a constant body temperature of between 38°C and 43°C, regardless of th temperature of the air around them. In cold weather, birds help retain this heat by fluffing ou their feathers to trap an insulating layer of air next to their warm skin.

Some species also huddle together in communal roosts to avoid losing heat. Birds whos chicks are naked when they hatch (known as 'altricial' or 'nidicolous' species) have to broo their chicks, which remain 'cold-blooded' (poikilothermic) until they fledge. Brooding bird cover their chicks with the soft feathers of their underparts, so their body heat keeps th youngsters warm.

Macaroni Penguins

Do birds have a skeleton?

Like all vertebrates, birds have an internal skeleton. However, it has been cunning customised to suit a bird's unique requirements. Many of the bones are hollow and criss crossed with internal struts, making them very strong yet incredibly light. This keeps a bird body weight to a minimum, allowing it to take to the air and fly. A bird's skeleton also has tw important modifications: the hind limbs and pelvis have shifted to enable it to walk or hop o two legs; while the forelimbs have been modified into wings, enabling most birds to fly. Th huge, keeled breastbone (take a closer look at a roast chicken!) is also a special fligh adaptation, since it holds the powerful muscles required for beating the wings.

Chicken skeleton

Big bird

The world's largest living bird is the Ostrich, which can weigh up to 136kg (300lbs) – about 85,000 times as heavy as the world's smallest species (see here). One specimen was said to have reached 150kg (330lbs). Unsurprisingly, the Ostrich is also the world's tallest living bird, occasionally reaching a height of 2.5 metres (well over eight feet).

An Ostrich with her brood of chicks

How do birds breathe?

Like mammals, birds have lungs, which extract oxygen from the air, transfer it to the bloo and expel waste carbon dioxide. Unlike mammals, birds also have a secondary system of a sacs located around their body and even inside their bones. This unique adaptation enable birds to circulate oxygen much more efficiently – vital for allowing them to fly without gettin out of breath.

Do birds perspire?

No. Birds don't have any sweat glands on their skin, so they lose excess heat by panting o seeking shade.

How fast does a bird's heart beat?

This depends upon the bird's size – and what it is doing. Large birds tend to have slow hea rates (the Ostrich's is only about 38 beats per minute), while most songbirds range betwee

200– 500 beats per minute. Hummingbirds may even reach more than 1,000 beats per minut
Heart rates increase in cold weather and when a bird is under stress. Our own hearts averag
about 72 beats per minute at rest.

The heart rate of a hummingbird is faster than that of any other bird

Do birds have teeth?

No modern bird has true teeth – these were lost during the evolutionary process of gettin
light enough for flight. But some species have sharp cutting edges on the mandibles of the
bill. A few tropical species such as the African barbets and the unique Tooth-billed Pigeon o
Samoa have tooth-like notches on their mandibles, but these are not used for chewing food.
chick ready to hatch has an 'egg-tooth', for chipping its way out. However, this is not a tru
tooth, and it drops off a few days after hatching.

What is the difference between a 'bill' and a 'beak'?

Except for spelling, nothing at all: the two terms are interchangeable (though birders an
ornithologists tend to prefer the term 'bill'). Both refer to the horny projection at the front
every bird's skull, consisting of the upper and lower mandibles – essentially the equivalent of
mammal's jaws.

The Common Snipe has a very long bill in proportion to its body length

What is a bird's bill made from?

The bill is bone covered by keratin. This extraordinarily flexible substance can take mar
forms, enabling bills to tackle all kind of jobs.

Pelicans use the pouch beneath their bill to scoop up food

What do birds use their bills for?

Birds use their bills for catching, carrying and manipulating food, collecting nest material ar building nests, excavating nest holes, defending themselves, and preening. Because the forelimbs have been adapted into wings, the tasks we humans perform with our hands ar fingers birds must do with their bills. Some birds, such as storks and albatrosses, also clatte their bills together as part of their courtship display.

Puffins have large, powerful bills specially designed for holding sand-eels

Why do some birds have such strange-shaped bills?

Every bill has evolved to suit a particular feeding technique, and this has produced som pretty weird shapes. Amongst the strangest belong to Puffins, whose bills have an 'elasticate

base so they can hold several small fish at once; spoonbills, whose spatulate bills conta sensitive nerve endings to detect minute food items; skimmers, whose lower mandible longer than the upper one, enabling them to 'skim' the surface of the water for morsels food; and crossbills, whose upper and lower mandibles are crossed to allow them to prise th seeds out of pine cones. But perhaps the weirdest of all is that of a wader found in Ne Zealand, aptly named the Wrybill. This is the only bird in the world whose bill curves sideway enabling it to probe for insect food under rocks and stones.

Roseate Spoonbills, like other members of their family, have a characteristic spatulate bill

Settling the bills

The longest bill belongs to the Australian Pelican, and may reach a length of 48cm (19in). The shortest bill belongs to the Glossy Swiftlet of South-east Asia, at just 4mm (one sixth of an inch) long. The longest bill relative to body size belongs to the Sword-billed Hummingbird of the northern Andes, and measures 9–11cm (3.5–4.3in), more than half the bird's total length. This extraordinary appendage enables the hummingbird to reach nectar hidden deep inside long flowers such as the climbing passion flower. The bill is so heavy that the bird has to hold it at an angle when perched, to avoid toppling over.

The Sword-billed Hummingbird of South America has the longest bill in proportion to its body-length

Why do some birds have deformed bills?

The keratin of a bird's bill grows continually, to compensate for being worn down by use. But the tip breaks from one mandible, then the tip of the other will have nothing to wear again and so will sometimes grow abnormally long. If a bill becomes twisted to the side then bo mandibles can grow, but will cross over. Birds with deformed bills can survive only as long a they are able to feed.

Tongue-tied

The bird with the longest tongue relative to body size is the Wryneck, a member of the woodpecker family, whose tongue may measure more than 8 cm (over 3 in) – about half its body length.

Do birds have tongues?

Yes, they all do, though this organ is more important for some than for others. Most birds d not have much of a sense of taste (see here), so many groups, including storks and pelican only have very small tongues. Parrots, by contrast, have a large, fleshy tongue to he manipulate their food; hummingbirds have a long, thin one to poke into flowers for necta and flamingos have a whopper, which helps to pump out water while they are filter-feeding Woodpeckers have proportionally the longest tongue of all; it is rooted at the back of th skull, and its barbed, sticky tip is designed for extracting insects from under loose bark.

Eagles have large, muscular tongues

What do birds use their feet for?

As well as the obvious functions of walking, running, hopping and swimming (see chapter 5 birds use their feet for a number of other purposes. These include perching (all passerines ar many other birds), catching food (especially birds of prey and owls), climbing (woodpecker parrots and nuthatches) and digging (underground-dwelling species such as the Burrowin Owl). Some species, including various wild game birds and the domestic chicken, even us their feet in combat with rival males – hence the sport of 'cockfighting'.

Male Coots often fight one another, using their powerful feet

How many toes do birds have?

Most birds have four toes on each foot. Some have only three, and the Ostrich has just tw
Birds' toes are arranged in one of three configurations: all four pointing forward for grippin
onto vertical surfaces (e.g. swifts); three toes pointing forward and one back for perchin
(passerines and most other birds); or two toes forward and two back for climbing or graspin
objects (woodpeckers, cuckoos and parrots, also some Owls). One species, the Osprey, ca
even adjust the arrangement: normally it points three toes forward and one back, but whe
catching fish it points two forward and two back, to get a better grip on its slippery prey.

Many waterbirds, like this Black Heron, have long, thin toes, three pointing forward and one back

What are webbed feet for?

Many unrelated families, including wildfowl (ducks, geese and swans), gulls, cormorants ar
petrels, have fully webbed feet, which enable them to swim more effectively. Other waterbird
such as grebes and coots, have developed lobed (partially webbed) feet for the same reaso
Webbing is not the only way that feet have adapted to help a bird get around: birds th
habitually walk on aquatic vegetation, such as rails and jacanas, have elongated toes to sprea
their weight across the surface; while some living in cold climates, such as ptarmigans, hav

feathered feet which act as snowshoes (and stay warm).

All ducks, like this Mallard, have fully webbed feet

Legging it

The Ostrich has the longest legs of any bird, reaching a massive 120cm (four feet) from hip to toe. The longest legs relative to body size belong to the Black-winged Stilt (and its various relatives), and constitute about 60 per cent of its total length.

Both the Ostrich and the Black-necked Stilt have very long legs

PLUMAGE

Why do birds have feathers?

Feathers do two main jobs for birds: they allow them to fly and they keep them warm. Foss evidence suggests that feathers probably evolved from reptilian scales, keeping bird ancestors warm in cold climates. Flight was a much later evolutionary development.

What advantages do feathers bring?

Feathers are miraculously versatile things. Their strength and lightness allow a bird to g airborne without using up too much energy, while their streamlined shape reduces a resistance. They also enable birds to maintain a constant body temperature by dispersing he in hot weather and trapping heat when it gets chillier. Last, but certainly not least, they ar vital for courtship displays, in which one (usually male) bird flaunts his fancy plumage in ord to attract a mate and/or repel a rival.

This albatross chick is still covered with down

What are feathers made from?

Feathers are made from a horny substance called keratin: a light, strong and very flexible for
of protein. Keratin is also found in a bird's bill and claws – and indeed in human hair an
fingernails. Feathers have several component parts: the central shaft, which is hollow at th
base and attaches to the bird's skin; the barbs, or side-branches, which are attached to th
shaft; and tiny barbules, which branch off the barbs and mesh with each other, giving th
feather its unique combination of strength and lightness. Different types of feathers hav
different uses: large wing feathers enable a bird to fly; contour feathers cover and streamlin
its body; and soft downy ones keep it warm.

Great Bustards use their feathers in a spectacular courtship display

How many feathers does a bird have?

This varies enormously, from fewer than 1,000 for some species of hummingbird, to more tha
25,000 in the case of the Whistling Swan of North America (most of which are on its head ar
neck). The number of feathers tends to increase with the size of the bird. So most passerine
have between 3,000 and 5,000 feathers, while a Bald Eagle has more than 7,000. Waterbird
tend to have more feathers than landbirds, to help keep them warm and dry.

Bald Eagles have more than 7,000 feathers, more than most birds

What are 'primaries', 'secondaries' and 'tertials'?

They are all types of flight feather found in the wing. Primaries are the longest feathe forming the wing tip, secondaries are the shorter ones along the inner part of the wing ar tertials are the ones close to the bird's body. Other wing feathers include scapulars and win coverts.

What is 'bird topography'?

It is simply a technical term for the way we define and name the various external features of bird's plumage (along with its 'bare parts', such as the bill and legs). Although birds ma appear very different in shape and appearance, they all have their feathers arranged in th same basic way. Knowing bird topography helps you navigate around a bird's appearance, an is vital for understanding moult (see here). It also helps birders identify similar-looking specie by noting subtle differences in their plumage features.

How does a bird look after its feathers?

Feather care is a top priority for any self-respecting bird. Techniques include preening (usin

the bill to clean individual feathers), scratching (with its feet) and bathing (either in water o using dust). Many birds have a special preen-gland just above the base of their tail. Th secretes preen-oil, which they then spread across the surface of their feathers with their bill. provides waterproofing and may repel parasites.

What happens if a bird damages its feathers?

Birds lead a strenuous life, and feathers take a constant battering; they are often lost o broken, and may become covered with a harmful substance such as tar. Broken or los feathers are generally replaced by new ones straightaway. So as long as a bird can still fee and fly it will probably survive, though it may be unable to migrate or get away from predator However, if a bird's plumage is covered with a contaminant, it may lose its ability to fly o swim, and will be unable to maintain the correct body temperature. Unless it gets clea quickly it will almost certainly die.

Even waterbirds like this Canada Goose have to bathe

How do birds bathe?

Usually, like us, in water. Most birds' favourite method is to partially submerge themselve (either at the edge of a pond, or in a puddle or bird-bath), and splash water over their wing and body while frantically shaking to make sure all the feathers get wet. Many waterbirds, suc as gulls and ducks, bathe while sitting on the surface of the water; though some seabirds, suc