Contents

CONTENTS

and natural history. Aristotle's pupils included Alexander of Macedon – Alexander the Great.

Of all Aristotle's bird-related information, there is one piece that stands above the rest. It relates closely to my own research on sexual reproduction. The chicken, or Domestic Fowl, as I prefer to call it, is the bird whose natural behaviour is most easily and clearly observed. Other species can be watched, but they usually offer little more than a glimpse. Farmyard fowl are tame and uninhibited, and behave much like their wild ancestor, the Red Junglefowl. The social organization of both the junglefowl and farmyard fowl consists of a dominant cockerel, a few subordinate males, and a harem of females with whom the dominant male is hell-bent on mating. Despite providing a convenient model for observing bird behaviour, the fowl is somewhat atypical in that it is polygynous, meaning that one male (the dominant cockerel) mates with the several females that comprise his harem. Most other birds, as Aristotle well knew, are socially monogamous and breed together as pairs, as most humans do.

The Domestic Fowl's domestic life – at least before large-scale commercial farming – is engrained in our minds through fairy stories and folklore. One writer aptly captured its essence: 'the cock is a jealous tyrant and the hen a prostitute'.[1]

Aristotle was fascinated by 'generation', a term that encompasses both copulation and embryo development – essentially all aspects of reproduction. Not only is generation the most fundamental aspect of animal life, in Aristotle's time and for centuries afterwards, it was also the most mysterious. It is hardly surprising, then, that Aristotle thought about it a great deal and devoted an entire book to the topic. Given the

uncertainty surrounding reproductive events, his account turned out to be a mix of fact, fiction and speculation.

Domestic Fowl, partridges and small birds, he says, copulate a lot, but raptors do not copulate very much at all. His explanation is probably not one that would occur to us today, even though it anticipates some modern ideas. His suggestion is that a trade-off exists between the size of certain parts of the body and copulation frequency. The thinness or weakness of certain birds' legs, he tells us, makes them prone to copulation, adding that 'this applies also to human beings'. As he explains, this is because the nourishment that was intended for the legs is diverted into semen. Because of their short, thick legs, raptors – he says – do not copulate very frequently.

He could hardly have been more wrong.

I became fascinated by how often birds copulate after discovering that – contrary to popular belief – the females of many species, despite being paired with one male and hence socially monogamous – were actually sexually promiscuous. The consequence of such promiscuity is that the sperm from different males compete inside the female's oviduct to fertilize her eggs. My colleagues and I referred to this entire field of research as sperm competition, and to copulations outside the pair bond as extra-pair copulations. The sixty-four-thousand-dollar question was how many extra-pair copulations would it take to result in one or more extra-pair offspring?

The answer, we assumed, would depend – at least in part – on how many pair copulations the extra-pair male had to compete with. Frustratingly, no one knew, for in the 1970s when my research started, there was almost no information available on how often birds copulated – not even for farmyard fowl. How would one find out? The answer was to

discover a bird species that could be monitored continuously throughout the copulation phase of its breeding cycle. The Domestic Fowl was the obvious choice, although, being polygynous, it wasn't the best starting point for trying to understand monogamy and its deviations.

I remembered that several decades earlier, in an effort to guard the nest of a pair of extremely rare Western Ospreys breeding at Loch Garten in Scotland, volunteers had undertaken round-the-clock observations, noting – among other things – the number of times the ospreys copulated. I duly obtained access to this goldmine of information and spent several weeks ploughing through years of notebooks to extract the necessary details. The results were extraordinary: 150 copulations for each clutch of two or three eggs. Although not all copulations ended in the necessary 'cloacal kiss' that signalled successful insemination, there was still an average of fifty-nine inseminations per clutch. A one-off mating with another male would not have much chance of fertilization, we guessed. Other raptors, it turned out, also had very high mating frequencies – and this is possibly the way that the male partner ensures that he is the father of the offspring he subsequently helps to rear.[2] How could Aristotle have got it so wrong? Easily. Neither he nor any of his contemporaries sat and watched undisturbed raptors at the nest in the same way as the Loch Garten volunteers had done.

On the other hand, Aristotle was right about Domestic Fowl: they certainly do copulate a lot. I was subsequently able to study the mating behaviour of free-living Domestic Fowl with Tom Pizzari, a talented PhD student, which revealed a level of copulatory sophistication that would have startled Aristotle as much as it startled us. We (Tom, mainly) showed

that cockerels know and recognize each hen in their harem, remember when they have copulated with them and, most remarkably of all, adjust the number of sperm they transfer to each female depending on the time since their last mating and whether that female had copulated with another male.[3]

Aristotle may have been muddled about some aspects of reproduction, but here is the standout example of his extraordinary insight. It concerns sperm competition in Domestic Fowl and a phenomenon known to present-day biologists as 'last male sperm precedence'.

When one cockerel, Aristotle informs us, is removed from a flock and replaced by another, it is the second male that fathers most of the subsequent offspring. Not too surprising, you might think, but the significance of this – and it seems that Aristotle understood it – is that even without copulating with a second male, the hens would have continued to produce fertile eggs and chicks. This occurs because female fowl store viable sperm for up to three weeks. When a second male replaces the first and starts to inseminate the hens, his sperm take precedence – hence the term. Aristotle did not know that the female fowl's protracted period of fertility was the result of stored sperm, but he seems to have recognized that replacing one male with another produced an unexpected result – why else would he have commented on this?

A further remarkable thing is that for Aristotle (or, more likely, his informant) to have known about this, the two cockerels must have been of different genotypes – distinct breeds – such that they sired offspring with different coloured plumage. Otherwise, how could anyone have known that the second male fathered more offspring?[4]

Last male sperm precedence, we now know, occurs in many different animals, from fruit flies to finches, in which females

mate with more than one male. And, of course, this is why it is worthwhile for a male to inseminate an already-mated female – there's always a chance of fertilization. For later biologists, including myself, figuring out the process by which a second male's sperm takes precedence was a fascinating challenge. Like Aristotle, I used Domestic Fowl to investigate this, but I used molecular methods – DNA fingerprinting – to assign paternity. Basically, in Domestic Fowl – and probably in most birds – the second male's sperm numerically swamps those of the first in the female's sperm stores. Simple? Yes, as are many biological phenomena when you get down to it, but demonstrating this convincingly was far from simple.

Why get excited by anything that in retrospect seems so obvious? The answer is that in other animals last male sperm precedence occurs for other reasons. In dragonflies, for example, second males physically drag the first male's sperm out of the female before introducing their own.

My research on sperm competition in birds was stimulated by discovering widespread female promiscuity and wondering about the competition between the sperm of their different partners. This became a major area of research and it would have been nice if I could tell you that it was all started by Aristotle's observations on chickens. Sadly, I cannot. The relevance of his second male sperm precedence observation lay unrecognized for millennia and was only 'discovered' by poultry biologists in the 1960s. This was a couple of decades before the subject of 'sperm competition' became popular among evolutionary biologists. Even so, I love this link – thank you, Aristotle – between the past and the present.[5]

Living on the island of Lesbos between 346 and 343 BC, Aristotle began to document what was known about the natural world – including birds – in the first truly systematic study of biology. His notes and observations of birds were far-reaching, and one of his most optimistic efforts was to try to create a classification of birds. He did so on what we can call 'functional types' or lifestyles – ways of making a living. For birds, this meant dividing them into raptors, marsh birds, water birds and so on, but this was not a taxonomic classification reflecting their true phylogenetic (evolutionary) relationships – that would have to wait for more than a millennium. Having said this, Aristotle did see an overall 'scale of perfection' in the animal world – with humans at the apex, plants and minerals at the bottom, and birds lying close to the top, just below quadrupeds and whales.[6]

More specifically, Aristotle understood that feathers were analogous to the scales of reptiles, and that there were different types – including the soft hair-like feathers of ostriches. He also knew that birds changed their feathers – and often their appearance – at certain times of year. He knew about the internal structure of birds, having dissected a dove, a duck, a goose, an owl, a pigeon, a partridge, a quail and a swan – but curiously, no passerine birds. He noted all the major organs, without much understanding of their roles, but commented on the existence of both a crop and a gizzard in some birds; on the Eurasian Wryneck's long tongue; and on the differences in the appearance of the gonads of the two sexes. He noted too, the zygodactyl feet of woodpeckers – two toes pointing forward and two back – unlike the three-forward-one-back of most other species. Aristotle is often said to have been the first to describe the development of the chick. He also thought, erroneously, that birds' eggs were laid with a soft shell – to

ease their passage – that hardened on exposure to the air. A touching idea, but not true.

Aristotle amassed information, both from his own observations and from those who lived close to nature such as fishermen, beekeepers and bird-catchers. He then sought patterns within the mass of accumulated 'facts' and from these generated general explanations for what was observed. He was sufficiently objective and open-minded to realize he might often be wrong: 'But the facts are incomplete, and if at any future time they are better established then more credence should be given to the evidence . . .'[7]

His approach was one that characterized science for much of its history. All areas of study go through an observation phase – equivalent to Aristotle's amassing of information. Then follows a period of trying to make sense of those observations; attempting to find some generalities or patterns that provide general explanations. Aristotle's followers in the next 1,500 years, however, saw his explanations as final. It was as if he had opened the door to understanding, then pulled it firmly shut behind him, because nothing more was required. But of course, nothing could be further from the truth. The difference between Aristotle's 'science' and what started in the mid-1600s was that Aristotle's 'explanations' were really just ideas – ideas that required the rigorous testing and verification introduced by the Scientific Revolution.

None of this is to undermine Aristotle's remarkable achievements. His approach, which included taking information from others, meant that he was bound to make some mistakes. Some later writers, including the Nobel Laureate biologist Peter Medawar and his wife Jean, considered Aristotle to be a dud. They referred to his works as 'a strange and generally speaking rather tiresome farrago of hearsay,

imperfect observation and wishful thinking'. But that's an overreaction, and places far too much emphasis on Aristotle's errors. Darwin was much more positive: 'Linnaeus and Cuvier have been my gods . . . but they were mere schoolboys to old Aristotle.' Similarly, for his recent biographer Armand Leroi, Aristotle was a scientific pioneer and the father of natural history who recognized that 'In all natural things there is something of the marvellous.'[8]

The Greeks' relationship with birds played a pivotal role in subsequent Western attitudes to nature in a way that the Egyptian attitudes did not. Aristotle considered birds special on account of their songs, calls and cries. He asks whether birds possess 'reason' – whether they have the ability to think rationally and to know what they are saying. The moral status of birds in Greek culture depended not on whether they could feel pain or experience pleasure – two traits Aristotle did not doubt – but whether they behaved rationally. Aristotle and other Greek philosophers believed that rationality was closely linked with language. The ability both to teach and to learn were, he believed, signs of a rational being. There was no speech without reason and no reason without speech. The vocalizations of birds are speech, so birds – above all other non-human animals – are rational and worthy of respect, he said.[9]

These ideas have their origin mainly in the observations of captive birds and I am continually amazed by how early in human history many fundamental ornithological insights were made. Wealthy Greeks kept birds as pets, and the Common Nightingale, with its luscious song, was a favourite. Aristotle knew – and this is now well established – that young birds acquire their song, in part at least, from hearing their parent. He was wrong in assuming it is the mother

nightingale who sings and teaches her offspring – a myth that took centuries to dispel. It is the male, as in most birds, that sings and from whom the young birds learn. In terms of this discussion, however, that is irrelevant. What made birds seem rational to Aristotle was the fact that species like the nightingale have the ability to teach their offspring, and that they in turn are receptive to being taught.

The realization that birds acquire their song from a parent was probably derived from Aristotle's observation that if young birds 'have been removed from the nest and have heard other birds singing . . . some sing a different note from the parent birds'.[10] I can appreciate why this made such an impression on Aristotle. I once had a pet Eurasian Siskin that had been reared by canary foster parents, and instead of uttering the typical wheezy siskin refrain, this little bird belted out pure canary song, an incongruity that stopped me in my tracks every time I heard it.

The other birds the Greeks enjoyed and marvelled at were those that can be taught human speech: parrots, starlings and corvids such as jays, magpies and ravens. For some, the ability to mimic human speech was the pinnacle of rationality, compellingly reinforced by the similarities in the way both birds and children acquired language.

Writing several centuries after Aristotle's death, Plutarch says:

> As for starlings and crows and parrots which learn to talk and afford their teachers so malleable and imitative a vocal current to train and discipline, they seem to me to be champions and advocates of other animals in their ability to learn, instructing us in some measure that they too are endowed with rational utterance.[11]

Plutarch was inspired by the example of a pet Eurasian Jay kept in a barber's shop and able to imitate human voices, animal sounds and mechanical noises. One day a funeral procession stopped in front of the barber's shop during which time the trumpeters continued to play. After the procession had passed, the jay ceased to utter its regular vocalizations, but later produced a perfect rendition of the trumpeter's tune. Plutarch attributed the bird's temporary silence to it consciously working out how to replicate the musicians' melody.

Mustering other evidence to support his idea of the rationality of birds, Plutarch points out that species like jays and Common Starlings do not imitate sounds at random, but are very specific in what they mimic – an observation amply verified by more recent studies – suggesting to him, at least, that birds are capable of conscious thought.[12] In the same vein, Porphyry of Tyre, writing in the third century AD, was convinced that birds knew what they were saying to each other – but our inability to understand them is no different from when we hear a foreign language, which he says is analogous to the 'clangour of cranes'.[13]

Plutarch and Porphyry attributed much more rationality to birds than Aristotle ever did. They assumed that birds' reason extended to prophetic and divinatory abilities, reinforcing the view that birds were closer to God than humans. More cautious and more rational, Aristotle finally decided that the ability of certain birds to mimic the human voice was nothing more than imitation. In doing so, he rejected the idea of avian rationality, thereby helping to set the agenda for the Christian view, in which birds are distinct from us.

It was a distinction that allowed Aristotle to write:

> Plants exist for the sake of animals . . . and animals for the good of humankind – the domestic species for his use and sustenance, and most if not all the wild ones for his sustenance and for various kinds of practical help as a source of clothing and other items . . . nature has made all these . . . for the sake of humans.[14]

This was a convenient idea that later re-emerged in the Bible: 'And God said, Let us make man in our image, after our likeness: and let them have dominion over the fish of the sea, and over the fowl of the air . . .'[15]

As with all previous cultures, and many future ones, birds were a resource.

A thread runs through the Palaeolithic, Neolithic and ancient Egyptian eras into ancient Greece and Rome and beyond, connecting people's ideas and beliefs about birds. Great travellers and traders, the Greeks had been present in Egypt since at least the eighth century BC. It has been argued by some that their later civilization – art, technology, religion, burial rituals, architecture and taste for spectacular sculpture – owed much to what they saw and learned there.[16]

It is almost as if, from narrow Egyptian beginnings, Greek culture welled up and flooded across the landscape, depositing its fertile ornithological ideas across different modes of thought. By around 500 BC the Greeks' ideas about birds, or at least the way they were articulated, were becoming increasingly sophisticated and employed to better understand, influence and control the natural world. We know about

these ancient thought processes because, unlike the Egyptians, the Greeks left an abundant written legacy.

The classical era spans a thousand years – from 500 BC to AD 500 – and a vast geographic empire. In terms of the study of the natural world, Aristotle was its main player in Greece, but in Rome it was Pliny the Elder. Their approaches to understanding birds and our relationship with them were as different as chalk and cheese. Separated by more than three centuries, Aristotle and Pliny are often discussed as though they were contemporaries, and even as though their expertise was similar. As a pair, they anticipate a situation that persists today: the careful, intellectually innovative scientific type – Aristotle – contrasted with the enthusiastic, sometimes careless popularizer – Pliny.

Over the centuries, the writings of both men have been hugely influential in the way we think about birds and other animals. People respected Aristotle's authority, but were inspired by Pliny's encyclopedic span and accessible style. As Aristotle's biographer Armand Leroi says: 'It was Pliny rather than Aristotle who provided the model for Renaissance natural history even if it was Aristotle, happily, who provided most of the substance.' And herein lies my fascination with them. On the one hand, I am in awe of Aristotle's brilliance and his intellectual efforts to understand the natural world. On the other, I admire Pliny's popularization of his predecessor's hard-won knowledge. The difference between them is like that between today's professional scientists who publish their findings in academic journals and the writers of popular natural-history books whose information is often an accessible digest of the scientists' efforts.

Pliny the Elder produced the most extraordinary and enduring encyclopedia of the natural world. He is thought to have died from the inhalation of toxic fumes in Stabiae in AD 79 while attempting to rescue friends by boat from the erupting Mount Vesuvius – the same eruption that smothered Pompeii and Herculaneum. Trained initially as a lawyer, he joined the army as an officer, as was typical of his elite equestrian class, but first and foremost he was a scholar. He lived in various parts of the empire, including France, Spain and North Africa, and during Nero's repressive regime he kept his head down by writing innocuously about grammar. Pliny started his vast natural history encyclopedia around AD 70, when his friend Vespasian was emperor, and completed it some seven years later. The book, among the largest from ancient Rome, and the only one of Pliny's to have survived, spanned mineralogy, geology, astronomy, botany and zoology, with information gleaned from a huge array of sources, including Aristotle.

For 1,500 years Pliny's works dominated all thoughts about the natural world. It was only once the Scientific Revolution began its reassessment of ancient knowledge in the 1600s that people began to question Pliny's authority. Increasingly thereafter, his work was viewed as:

> a repository of tales of wonder, of travellers' and sailors' yarns, and of superstitions of farmers and labourers. As such it is a very important source of information for the customs of antiquity, though as science, judged by the standards of his great predecessors, such as Aristotle . . . it is simply laughable.[17]

Eagles, Pliny says,

> lay three eggs, and generally hatch but two young ones, though occasionally as many as three have been seen. Being weary of the trouble of rearing both, they drive one of them from the nest: for just at this time the providential foresight of Nature has denied them a sufficiency of food, thereby using due precaution that the young of all the other animals should not become their prey.

There are two ideas here, one right, the other wrong. Eagles often lay more eggs than they rear, and usually one chick is killed by its older sibling, especially if food is short. This 'brood reduction', as it is known, has evolved because – strange as it might seem – it results in the eagles leaving more descendants overall throughout their lifetime. It has not evolved to minimize predation on other species as Pliny supposed.[18]

Of the Common Cuckoo, Pliny states:

> It always lays its eggs in the nest of another bird, and that of the ring-dove [Common Wood Pigeon] more especially, mostly a single egg, a thing that is the case with no other bird; sometimes, however, but very rarely, it is known to lay two. It is supposed that the reason for its thus substituting its young ones, is the fact that it is aware how greatly it is hated by all the other birds; for even the very smallest of them will attack it. Hence it is, that it thinks its own race will stand no chance of being perpetuated unless it contrives to deceive them, and for this reason builds no nest of its own.

Some of Pliny's knowledge of the cuckoo is lifted from Aristotle, who was the first to document this species' parasitical breeding habits. But Pliny's account is a mix of fact and fiction. Cuckoos usually deposit only a single egg in each

host's nest, although occasionally a second cuckoo adds an egg. The Common Wood Pigeon, however, is rarely parasitized. Cuckoos are indeed attacked by other birds, in their attempts to avoid being parasitized, but being *hated* by other birds is not the reason cuckoos are parasitic. Brood parasitism evolved because brood parasitism works.[19]

Pliny adds:

> In the meantime, the female bird [the host], sitting on her nest, is rearing a supposititious and spurious progeny; while the young cuckoo, which is naturally craving and greedy, snatches away all the food from the other young ones, and by so doing grows plump and sleek, and quite gains the affections of his foster-mother; who takes a great pleasure in his fine appearance, and is quite surprised that she has become the mother of so handsome an offspring. In comparison with him, she discards her own young as so many strangers, until at last, when the young cuckoo is now able to take the wing, he finishes by devouring her.

Yes, the foster parents lavish care onto their uninvited guest as though it was their own offspring, but the foster parents do not discard or abandon their own young; Pliny has overlooked Aristotle's accurate observation that the newly hatched cuckoo chick ejects the host young (documented in detail by Edward Jenner in the 1780s – but even then not universally accepted). Nor does the young cuckoo, as Pliny states, devour its foster parent – a suggestion based on the fact that when feeding its enormous chick, the foster parent often puts its entire head inside its mouth.[20]

On Indian Peafowl, Pliny tells us when the male 'hears itself praised, this bird spreads out its gorgeous colours, and especially if the sun happens to be shining at the time,

because then they are seen in all their radiance, and to better advantage'.

A peacock's inclination to display has – obviously – nothing to do with hearing itself praised, but research in 2013 showed that sunshine is important, with males specifically orientating themselves about 45 degrees to the right of the sun's azimuth, with the female positioned directly in front. Oriented in this way, the male shows off the array of iridescent eyespots on his tail to their greatest effect.[21]

To his credit, Pliny says that the idea that peacocks are both vain and spiteful 'in the just the same way that a goose is "bashful", appears to me to be utterly unfounded'. Similarly, he debunks the idea that 'at the moment of a swan's death, it gives utterance to a mournful song' – swan song. He says: 'This is an error, in my opinion, at least I have tested the truth of the story on several occasions.'[22]

In describing the song of the Common Nightingale, Pliny says, 'That there may remain no doubt that there is a certain degree of art in its performances, we may here remark that every bird has a number of notes peculiar to itself; for they do not, all of them, have the same, but each, certain melodies of its own.' Absolutely correct. He adds an interesting comment saying: 'Men . . . have been found who could imitate its note with such exactness, that it would be impossible to tell the difference.' Such is the extraordinary quality of the nightingale's song, imitating it with exactness is extremely difficult, but this is what happened to save a live radio duet that was supposed to occur between the cellist Beatrice Harrison and a nightingale in her Surrey garden in 1924. The bird, which had accompanied Harrison on previous nights, declined to perform in the presence of the recording equipment. At the last moment, and unbeknown to the BBC's listeners, a 'siffleur' – probably

Madame Maude Gould, also known as Madame Saberon – launched into a coloratura performance to save the day.[23]

Of the partridge:

> In no other animal is there any such susceptibility in the sexual feelings; if the female only stands opposite to the male, while the wind is blowing from that direction, she will become impregnated; and during this time she is in a state of the greatest excitement, the beak being wide open and the tongue thrust out. The female will conceive also from the action of the air, as the male flies above her, and very often from only hearing his voice.

Sadly, not true.

> Caprimulgus is the name of a bird [the European Nightjar], which is to all appearance a large blackbird; it thieves by night, as it cannot see during the day. It enters the folds of the shepherds, and makes straight for the udder of the she-goat, to suck the milk. Through the injury thus inflicted the udder shrivels away, and the goat that has been thus deprived of its milk, is afflicted with incipient blindness.

A fabulous myth that gave rise to the bird's common name of 'goatsucker', still familiar to birders today.

As Pliny informs us, the Romans ate birds of all kinds. They differed from their predecessors, however, by feasting on avian novelty, eating the entrails, brains, testicles, gizzards and tongues of unusual birds. As in certain parts of the world today, bizarre food items for the Romans signalled exclusivity and status – and to many of us now, a kind of depravity.

Romans ate thrushes, presumably winter migrants, captured and then fattened in special aviaries. Some at least were allowed to fly out from a roasted wild boar as it was cut open at the table – a forerunner of the four and twenty blackbirds baked in a pie. The tongues of birds were popular among Roman epicures and no more so than those of the nightingale. It seems unlikely that these really were tongues that were eaten. A nightingale's tongue, like that of most small birds, is barely worth the effort, consisting of little more than two barely digestible hyoid bones and a few meagre scraps of muscle. Later, as Mrs Beeton's famous nineteenth-century cookbook makes clear, what were commonly referred to as larks' 'tongues' were actually their breast muscles, which were much more substantial and tasty. It is unlikely that elite Roman diners knew or cared about the difference between a lark's tongue and its breast muscles. Parrot tongues were also a Roman favourite, and in this case fairly substantial, for these birds possess a large fleshy tongue that they use both for manipulating food and for vocalizing, just as we do.

The ultimate tongue in Roman cuisine, however, was that of the flamingo. There were no flamingos in Italy, so the birds – Greater Flamingos – must have been imported from elsewhere, probably Spain, southern France and North Africa. As later anatomists demonstrated, the flamingo's large, erectile, turgid tongue has evolved to pump water through the bird's beak, so that any edible particles, such as diatoms, seeds and tiny brine shrimp are trapped on the 'lamellae', in much the same way as krill are filtered from seawater by baleen whales.[24]

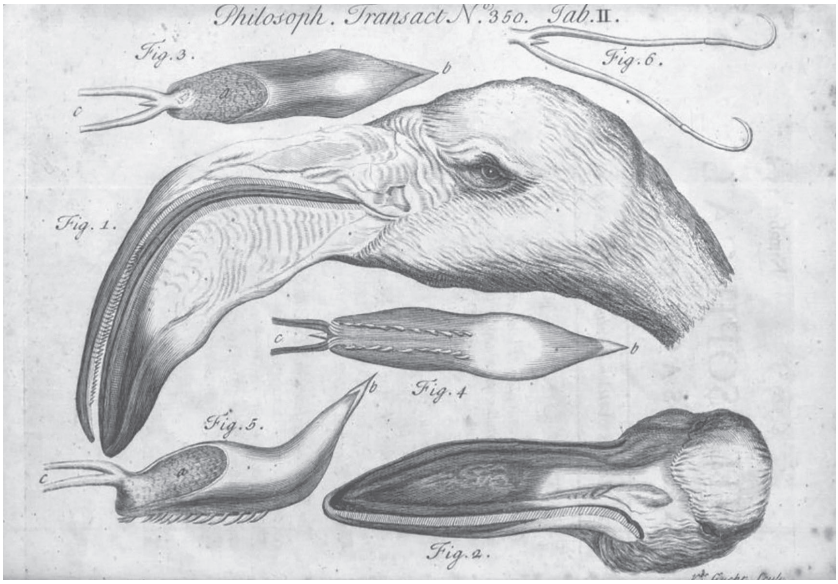
The flamingo features in *Alice's Adventures in Wonderland* precisely because it is such a surreal and spectacular bird. Its scientific name *Phoenicopterus* – meaning crimson wing – refers,

as does 'flamingo' itself, to the bird's flame-red plumage, whose colour derives from the carotenoids in its diet. With their pigmented plumage, long neck, long legs and curiously constructed heads, one can imagine flamingos featuring on Roman dining tables as lifelike mounts, much as peacocks and swans did at medieval banquets. The flamingo's habit of feeding its chick on a crimson brine-shrimp soup dribbled from the bill into the mouth of its offspring almost certainly gave rise to the myth of another water bird, the pelican, feeding its young on blood pierced from its own breast. The great French naturalist and author the Comte de Buffon, in his vast animal encyclopaedia of the late 1700s, mentions how the flamingo was held in such high esteem by the Romans that:

> When Caligula had reached such a pitch of folly as to fancy himself a divinity, he chose the flamingo . . . as the most exquisite victim to be offered up to his godship; and the day before he was massacred, says Suetonius, he was besprinkled at a sacrifice with the blood of a flamingo.[25]

The first-century cookbook by Apicius, whom Pliny the Elder described as 'the most insatiable gorger of all gluttons', includes a recipe for flamingo and is responsible for establishing the idea that the flamingo's tongue was the ultimate in Roman gourmandizing. Emperor Vitellius, renowned for his cruelty and gluttony (and who was assassinated in AD 69 after just eight months in office), was once served a feast comprising 2,000 fishes and 7,000 birds. At one of his own banquets, Vitellius presented his guests with a platter comprising the livers of pike, the brains of peacocks and pheasants, the milt of lampreys and the tongues of flamingos. Another emperor, Heliogabalus (204–22), was said to have served up 'dishes filled with the tongues of flamingos'.[26]

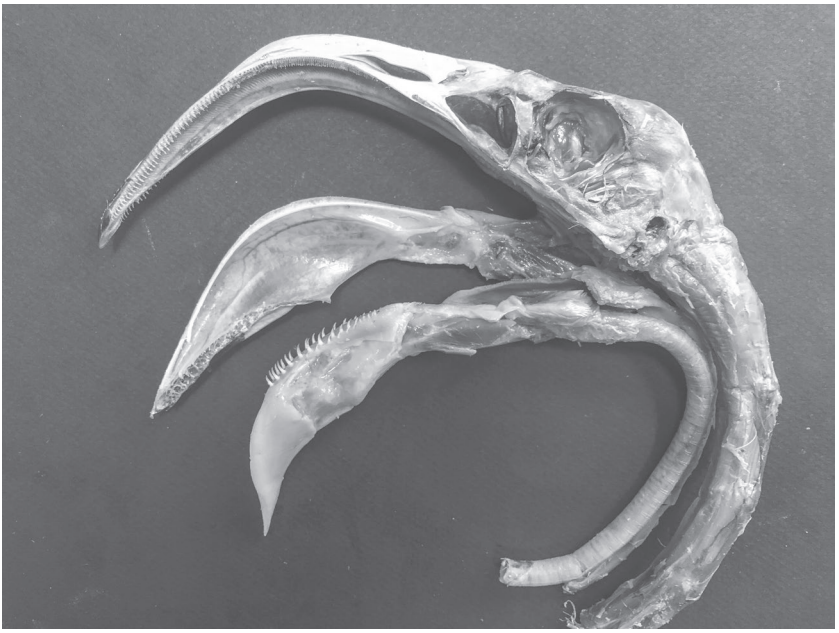
I have always found the idea of eating tongue repulsive. When I was a child my family used to serve tinned cow's tongue as a Christmas 'treat', but I studiously avoided it. My reluctance is illogical, since a tongue is merely muscle just like other parts of animals that are eaten routinely, but there's something too intimate about eating an animal's tongue. For the same reason, I have never been tempted by a pig's pizzle, or *huevos de toro* or other offally bits that were regularly eaten in the past. A flamingo's tongue seems similarly unattractive, but, according to my anatomist colleagues, it is both muscular and fatty, and, once the recurved spines are removed, is probably good eating. Buffon noted that 'some of our navigators, whether from the prejudice derived from antiquity, or from their own experience, commend the delicacy of that morsel'. Buffon's navigators include the natural historian Jean-Baptiste Du Tertre, who visited the Caribbean in the mid-1600s and who said of the American Flamingo: 'their tongue is very large, and near the root there is a lump of fat, which makes an excellent morsel'. The pirate naturalist William Dampier shot and ate Greater Flamingos in the Cape Verde Islands in 1683, reporting that their flesh was 'lean, black and savoury, with the tongue being particular tasty and a dish for the king's table'. In the nineteenth century another naturalist, Alcide Charles d'Orbigny, a disciple of Cuvier and one of Darwin's many correspondents, commented that he saw a lake in Egypt 'covered in small boats going out to hunt flamingos. These boats would return full of birds, from which the Arabs removed the tongue, in order to extract from it, by pressure, a greasy substance that they used as fat'. Not everyone shared the Romans' lingual enthusiasm and the sportsman Abel Chapman, author of *Unexplored Spain*, in



The head and tongue of a Greater Flamingo as drawn and described by James Douglas in the Royal Society's *Philosophical Transactions* (Douglas, 1714).

1910, found them: 'Quite uneatable – tough as India-rubber; even our dogs refused the delicacy.'[27]

I was intrigued by all of this and determined to see and taste this delicacy for myself. My inquiries were rewarded by being sent the head of a Greater Flamingo, sadly inedible because it was preserved in industrial alcohol, but dissecting it was a revelation. The tongue was surprisingly fleshy, and very, very fatty; embedded in it were some elongated cartilage structures – extensions of the hyoid tongue bones – from which a gourmet would have to suck the fat. And then another lead: an Italian ornithologist wrote to say how he had once cooked a flamingo using a modern take on Apicius' original recipe. He added: 'Should you happen to pass through northern Italy we can prepare and taste a couple of tongues together, trying to stick to Apicius' advices. Just tell



My dissection of the head of a Greater Flamingo, showing, from top to bottom: the upper mandible, lower mandible and the tongue that in life would lie inside the lower mandible (photo: Tim Birkhead).

me with some advance, so that I can alert my taxidermist colleague not to throw the tongues away when casualties from crashing into wires will be available'. Tempting.[28]

While it is true that Pliny's writings on birds helped to perpetuate many ancient myths and much erroneous information, it may be slightly unfair to pit him against Aristotle in the way I've done here. Aristotle's information about birds comes from his lecture notes, or possibly from those of his students, hence their dry, concise nature. What we do not have are Aristotle's writings intended for a general readership, which were lost many centuries ago. Imagine if they, rather than his lecture notes, had survived. Would our opinion of Aristotle be more similar to the way we think of Pliny?

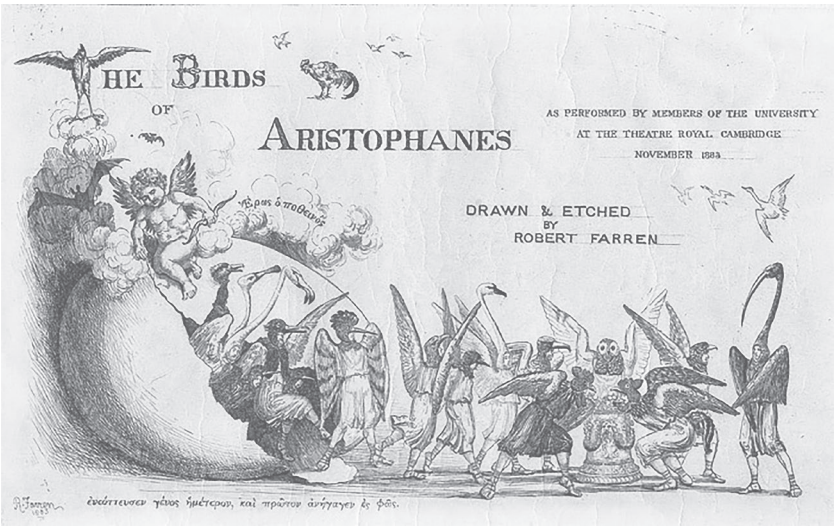
Perhaps not, for it is unlikely he'd have ever compromised on what he felt was the truth. And as the Roman man of letters Cicero says, Aristotle's popular accounts were as beautifully written, as 'a river of gold'.[29]

The myths about birds with which both Aristotle's and Pliny's works abound have their origins in the past, and notably in the fifth century BC and Aristophanes' comedy *The Birds*. It is here that we discover the true value of birds:

> You don't start on anything without first consulting the birds,/ whether it's about business affairs, making a living, or getting married./ Every prophecy that involves a decision you classify as a bird./ To you, a significant remark is a bird; you call a sneeze a bird,/ a chance meeting is a bird, a sound, a servant, or a donkey – all birds/ So clearly, we are your gods of prophecy.[30]

The key to understanding this otherwise puzzling passage is the fact that in its original Greek, the word for bird, *ornis*, is also the word for an omen. In other words, because birds are augurs they were to be consulted whenever a decision was to be made.

The seasonal appearance of migratory birds like Barn Swallows or White Storks in Greece was associated with the coming spring, and the idea that this was a propitious time for farmers to plant crops. The drumming of a woodpecker sounds like distant thunder or the drumming of rain on a roof, hence their supposed ability to anticipate wet weather. The fact that Carrion Crows and Northern Ravens typically operate as pairs throughout the year gives a sense of fidelity – which turns out



Artist's impression of Aristophanes' *The Birds*, one of a series of etchings linked to a performance of the play by King's College, Cambridge students in 1883 (courtesy of King's College, Cambridge).

to be true, in terms of not only their enduring pair bond, but also their sexual fidelity. Another association is that between ravens and death. Crows, ravens and vultures were a frequent sight in the aftermath of war, scavenging on corpses, so the link between these birds and death is hardly surprising. The Greeks also knew that ravens are smart, both from birds kept as pets and from the fact that they seemed somehow to know when a battle had occurred and turned up to feast on the dead. We now know that birds have a better sense of smell than we once supposed, so this may be one way they discover new food sources, but ravens also take their cues from other birds, following individuals that seem to know what they are doing, or look smugly well fed.

Since the earliest written records, parallels have been drawn between birds and people: as greedy as a gannet, daft as a

coot, a cuckold and the foolish guillemot. Many of these attributions date back centuries, and the fact that they have survived intact for so long is probably an indication of their appropriateness.

Pliny devotes more space in his *Natural History* to eagles than almost any other group of birds, telling us that they are the most honourable and strongest of birds. As we might expect, there's plenty of eagle misinformation, including the eagles whose nests contain a stone within a stone with great medicinal powers. Pliny repeats Aristotle's accurate observation that eagles need a 'large tract of country to hunt over' and how in the early hours of the day eagles perch 'quite idle' and fly mainly in the afternoon. He also describes how in 104 BC the eagle's reputation for honour and strength resulted in it being adopted by the Roman military as their standard (*aquila*) when it became the custom to carry the eagle into battle.[31]

Ferocious animals have been used as visual metaphors in various cultures, but eagles were pre-eminent in terms of their size, visual acuity, effortless flight and, above all, the killing power of their massive feet and talons. Eagle motifs are the emblems of numerous nations. The Egyptians' more modest veneration of falcons was part of the same tradition. Through vast tracts of time, birds of prey have been among the most enduring symbols of supremacy and, as we will see in the next chapter, eventually came to define an entire social class.

4. Manly Pursuits: Hunting and Conspicuous Consumption

> He cannot be a gentleman that loveth not hawking and hunting.
>
> James Cleland (1607)

The last Anglo-Saxon king of England, Harold Godwinson, who died at Hastings in 1066 allegedly with an arrow in his eye, was said to be obsessed with falconry, only ever putting his bird down when needing both hands to eat.[1]

The Bayeux Tapestry opens in the year 1064 as Harold sets out on horseback – with a hawk on his left fist – on a diplomatic mission to meet William (the Bastard), Duke of Normandy. Trotting southwards towards the Channel, Harold's aim is to leave for France from Bosham on the West Sussex coast. Once at sea, however, his boat is blown off course and, making landfall at Ponthieu, he is captured by Guy (aka Wido) of Ponthieu, where – hawk still on hand – he is taken under guard to Guy's palace at Beaurain. From there Guy, who also carries a hawk, escorts him to William's residence at Rouen. On arrival, Harold's hawk is passed to William, suggesting either that it was taken from him or that it had been brought as a gift for William. On his eventual release, Harold returns to England. Now, fast forward to 5 January 1066 when Edward the Confessor dies, childless, and Harold, the king's brother-in-law, is crowned king of England the next day. News travels swiftly back to William in

Normandy, who, as Edward's cousin, assumes himself to be the rightful heir and, after amassing an army, invades England, killing Harold at Hastings on 14 October.

The first person to analyse the birds in the Bayeux Tapestry was zoologist and ornithologist William Brunsdon Yapp in the 1980s. Known as 'Brunny' to his friends, Brunsdon was Yapp's mother's maiden name which he added to make himself 'distinctive' on going up to Cambridge as an undergraduate. After a career as a lecturer at the University of Birmingham, where he was considered a curmudgeon, Yapp's study of birds in medieval iconography was his retirement project. He wasn't the first academic to be interested in medieval birds but his extensive research made a substantial contribution to understanding our relationships with birds in the Middle Ages. He spread his net wide and, as well as scrutinizing the birds in the Bayeux Tapestry, he analysed, identified and reported on birds in misericords, missals, psalters and bibles as well as in the great treatise on falconry written in the early thirteenth century by the Holy Roman Emperor Frederick II.[2]

Over the years, Yapp and other scholars have gently teased apart the threads of the Bayeux Tapestry in search of hidden meanings. Yapp paid particular attention to the species of hawks depicted, in the hope that this might reveal more of what was actually happening. Identification was important because it was thought that the species of raptor one owned reflected one's social rank. Harold's hawk was initially assumed to be a Eurasian Sparrowhawk – among the smallest of the birds employed in falconry – and used here to signal Harold's insignificance. But as Yapp points out, it is clear if one looks at the tapestry that both his and Guy's hawks are far larger than a sparrowhawk, and

therefore much more likely to be Northern Goshawks. And, although the idea of a socially enforced link between hawks and status – a kestrel for a knave etc. – has no basis in fact, large, supremely powerful raptors like goshawks and Gyrfalcons automatically conferred greater prestige than a diminutive sparrowhawk or Merlin.[3]

Harold and Guy both hold their hawks in their left hand, and their horses' reins in the right, as was the tradition. This is thought to be the basis of the English riding (and later driving) on the left-hand side of the road. There is also a puzzle: Harold and Guy each hold their hawk on a bare, ungloved hand, something that no falconer now would contemplate.[4]

Completed in the 1070s, the Bayeux Tapestry tells the story of the events leading up to and including the Norman invasion of England. Meticulously observed and executed, seventy metres long and fifty centimetres wide, it was commissioned by Bishop Odo, William's half-brother, and made – embroidered – by expert needlewomen in southern England. In one sense the tapestry seems to me rather like an elaboration of the El Tajo cave paintings, a similarity reinforced by the 200 tiny birds in the tapestry's margins, above and below the main narrative. As Yapp points out, the sheer number of birds in the Bayeux Tapestry is unusual, for it was not for a further two centuries that birds started to appear in abundance in illuminated manuscripts. He speculates about where the images came from: were they copied, drawn from life, or simply from the artists' imagination? Despite the limitations of working in textiles rather than paint, the distinguishing features of species like the crane or the peafowl render them readily identifiable.[5]

Historians have wondered whether those miniatures along the tapestry's border might offer some additional insight into

medieval life, including our relationship with animals. Certainly, there are scenes of farming, of a man directing a slingshot at birds and of a raptor in pursuit of a running hare. In some instances, however, the bird marginalia are there to reinforce the main narrative, as in the case of birds flying in the same direction as the invading Norman forces, or, at the point where Harold is captured by Guy in 1064, the birds in the border have their necks tied in knots – the strangulation of Harold's ambition. Prominent also among the marginal birds on the tapestry are those from the moralizing scenes in Aesop's fables: the crow and the fox, warning of the risks of flattery; the crane and the wolf, telling us not to expect a reward for serving the wicked; and the kite and the frog, reminding us of how the treacherous are destroyed by their own actions.

Falconry's origins lie in the distant 'Orient', some time after the last Ice Age, probably between 2000 BC and 750 BC. Rock art dating from 1300 BC in ancient Anatolia depicts raptors with their attendants, and there is mention of falconry in China even earlier, although not everyone is convinced by this.

There's no evidence that the ancient Greeks ever practised falconry as we now know it, and the 'hawking' mentioned by Aristotle in his *Remarkable Things Heard*, comprised:

> [an] occurrence, which is incredible to those who have not seen it. For boys, coming out of the villages and places round to hunt small birds, take hawks with them, and behave as follows: when they have come to a suitable spot, they call

> the hawks addressing them by name; when they hear the boys' voices, they swoop down on the birds. The birds fly in terror into the bushes, where the boys catch them by knocking them down with sticks. But there is one most remarkable feature in this; when the hawks themselves catch any of the birds, they throw them down to the hunters, and the boys after giving a portion of all that is caught to the hawks go home.

Jeremy Mynott has pointed out in his *Birds in the Ancient World* that it would actually make more sense if the beaters were flushing the birds for the hawks to catch, rather than the other way round. Nevertheless, a reciprocal arrangement like this, or one in which men stole prey captured by hawks, may well have been the beginning of hawking.[6]

As one falconry scholar has said:

> Whoever conceived of turning a raptor into a hunting weapon must have seen certain birds catch game faster than he could set an arrow or throw a spear. It could do this at a much greater distance than his weapons reached. Raptors could also spot game far beyond the hunter's eyesight. Whoever imagined that he could harness these awesome talents for his own use must have been something of a visionary.[7]

There is a sliver of evidence that Romans might have engaged with falconry: a fragment of an intriguing mosaic dating from the middle of the Visigothic period in Portugal, around AD 500, of someone holding a hawk – a Eurasian Sparrowhawk or Northern Goshawk.[8] This doesn't necessarily mean the Romans were falconers; the image could well have been that of an exotic visitor whose unusual accoutrement made him worth depicting. After the Romans left

Britain in 410, the invading Saxons brought falconry with them, igniting a passion that would burn undiminished in Britain for over a millennium.

There were two types of Saxon falconers: fowlers, who used trained raptors to catch food for the table, usually for a wealthy employer, and the nobility, mainly Saxon kings, who flew falcons for fun.

In both cases, birds were acquired either as chicks and reared in captivity, or as adult birds taken from the wild and then trained. Training was brutal, comprising control over the birds' food intake, but also 'seeling' their eyelids – sewing them together – so the birds were shielded from any visual disturbance until such time as they were under control. Once a bird was controllable, it was exposed to horses, dogs and people so that it became used to them, and its eyes un-seeled.

There were two classes of raptor: falcons, birds with long, pointed wings that usually attacked their prey from high in the air, killing them through high-speed impact, and hawks, which hunted low over the ground or in woodland with their short wings and killed by grasping. Species like the goshawk have disproportionately large feet, and slow-motion film footage shows how, on making contact with their prey, they and their smaller cousin the sparrowhawk pump their talons rapidly in and out to disable their victim. Goshawks were (and are) typically flown at ducks, pheasants, Rooks and hares. Notwithstanding these two distinct types of predatory bird, the terms 'hawking' and 'falconry' are used interchangeably.

Falconry was at that time the sport of kings, and the nobility's falconers required special attributes. The scholar Adelard of Bath, born around 1080, states that the falconer must be

(continued...)

Index

Page references in *italics* indicate images.