

Do birds smell?

Professor Tim Birkhead
University of Sheffield



Starling, by John Harding



We often think of birds in terms of their bright plumage and rich songs, implying that birds rely on vision and hearing as their main way of sensing the world. But what of their other senses, smell for instance...

A fascinating ornithological discovery made in recent years is that certain birds - the Starling is one - deliberately place the green leaves of certain aromatic plants in their nests specifically, it appears, to keep parasites such as lice at bay. As though this isn't extraordinary enough, we now know that these birds identify which plants to pluck by recognising their smell. Why is this extraordinary? Because, until relatively recently it was assumed that most birds have no sense of smell.

Apart from vision, which is so obviously excellent in the majority of birds, biologists have paid relatively little attention to the senses of birds. Hearing has played a very second fiddle to sight, not because it is unimportant - it is crucial, given that so many birds communicate by sounds - but because it is difficult to study. As for their other senses: touch, taste and smell, as ornithologists and bird lovers we've written birds off as 'insensitive'.

Nothing could be further from the truth. Today there is overwhelming evidence that certain birds have an incredible sense of smell. But for some reason we still find that difficult to accept. My advice is this: Accept it! Certain birds smell better than you or me.

HOW DO WE KNOW THAT BIRDS HAVE A SENSE OF SMELL?

There are several lines of evidence. The first to be discovered was anatomical. In mammals, like ourselves, the fore part of the brain holds the 'olfactory bulb'. This is a blob of tissue that miraculously transforms electrical signals, triggered by certain airborne molecules in the nose into something we think of as smell. In some birds the olfactory bulb is relatively large, while in other species it is quite small.

Richard Owen, a contemporary of Charles Darwin, was a superb anatomist (but an evil social climber) and in the 1800s dissected one of the first kiwi bodies to be

The Turkey Vulture has an amazing sense of smell, something that it uses to locate recently dead animals.



Turkey Vulture, © Larry Michael/naturepl.com

brought back to Britain. Owen declared - from the size of its olfactory bulb - that it must rely on its sense of smell. Another relevant bit of anatomy is the nasal passages near the base of the beak (their technical name is chonchae). Just as in ourselves, these passages comprise delicate scrolls of tissue-covered bone (easily broken during fights and nose-resaping). The more complex the scrolling, the greater the surface area for smell detection. In the 1960s, an American woman with the wonderful name of Betsy Bang, who was drawing specimens for her anatomist husband, noticed that in three species where there was some behavioural evidence that they had a sense of smell, the kiwi, Snow Petrel and the Turkey Vulture, the nasal conchae were much more convoluted than in other birds.

Evidence for a sense of smell in Turkey Vultures was demonstrated almost by accident. It was assumed that this species finds their carcass prey by smelling them, yet attempts to test this in the early 1800s were rarely successful. This was because it was erroneously assumed that the vultures favoured decomposing and smelly carcasses, whereas in fact they avoid these and are only really interested in recently dead animals. New tests with fresh carcasses proved the point. But what was it the vultures were homing in on? The answer came from an unlikely source. Kenneth Stager who conducted this research in the 1960s was talking to engineers who looked after the California gas pipeline. They told him they could tell when there was a leak in the pipe because the Turkey Vultures always congregated around it. It turns out that since the 1930s the company had added a very smelly substance known as 'mercaptan' to the gas to help humans detect leaks, but the birds were infinitely more sensitive to it than people. It also turns out that when an animal such as a deer or cow dies, its body naturally gives off mercaptan - hence the ability of the birds to home in on their food. Stager got hold of some mercaptan blew it across the California hills and the vultures flocked in towards it.

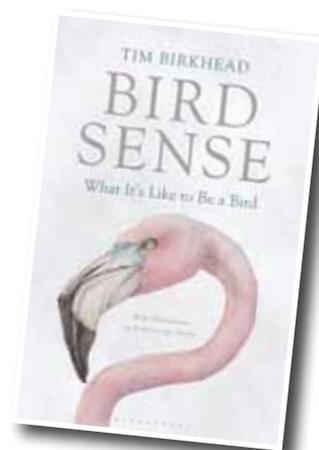
MORE FAMILIAR BIRDS

Closer to home we have a bird that appears to have remarkable ability to smell. It is hardly a garden bird though they do turn up in GBW gardens occasionally, and usually in hard weather; the Woodcock. Like the kiwi this is a bird that lives predominantly in the dark and

finds its food by probing in soft earth or mud. Unlike the kiwi, the Woodcock has enormous eyes, placed high on its head for all-round vision, because it is vulnerable to predators. The kiwi in contrast evolved in a predator-free environment (sadly not the case now where dogs are a serious threat), and gave up both the ability to fly and the ability to see, concentrating on its other senses instead. It can smell earthworms through 15 cm of soil!

The kiwi's ability to smell has been known for well over a century. In contrast, the Woodcock's olfactory prowess, has been known for almost two millennia! A poem written in 280 AD refers to the birds' incredible ability to smell worms. This isn't a one-off story, there are several similar independent accounts. An educated traveller William Bowles visiting Spain in the 1700s quietly sat and watched a Woodcock foraging in the royal aviaries. The bird simply never missed. It wasn't a case of 'lucky-dip' - sticking its beak in and hoping to hit something. The bird appeared to be able to smell the worm before it stuck its beak into the ground! George Montagu, a British ornithologist and author of the first Ornithological Dictionary (1802), kept several Woodcock in his aviary and commented on their remarkable ability to smell food. Whereas the feeding behaviour of kiwis has been studied in some detail, so far no-one has conducted a similar investigation of the Woodcock, to see how the two compare.

Next time you are watching birds foraging in the garden, think about which of their various senses they might be using. Or perhaps even set up your own simple experiments to check their ability to find different food items by smell. ■



If you want to know more about birds and how they sense and interact with the world around them, then Tim's latest book '*Bird Sense*' will make an interesting read. Published by Bloomsbury (HB), it is priced at £16.99 and available online and from bookshops. ISBN 9781408820131

