My Word

My bird

Birds are all around us. Their sounds, their visual appearance or their striking behaviors, however fleeting, can profoundly influence how we see birds and nature at large. Below, contributors to our 'Birds' special issue recall encounters with birds that in one way or another shaped them or their science.

Gibson's Albatross (*Diomedea antipodensis gibsoni*)

Photo: Damien Farine.

On a stunning winter day off the coast of south-eastern Australia, we encountered a small group of Gibson's albatross. I was helping with a project catching and marking seabirds at sea, a veritable escape from my job working at the nearby Port Kembla steelworks. Two of the birds that we caught were already marked. After hauling them into the boat, we quickly discovered that they had consecutive band numbers! Many thousand albatross have been fitted with metal bands over the past decades, so what are the odds of getting two consecutive numbers? Later that evening, the database revealed that they had been first (and last) caught, together, eight years earlier. They were also caught at almost exactly the same location. What had they been doing in the meantime? What were they doing moving together (at least twice) thousands of miles from the nearest breeding colony? This observation and these questions ultimately led me to starting my PhD on social behaviour in birds, and discovering that birds have rich social lives outside of the breeding seasons and breeding sites, where they have predominately been studied.

Damien Farine is an Associate Professor at the Australian National University and an Eccellenza Professor at the University of Zurich. His research focuses on how social behaviour affects the interaction between individuals and their environment, in particular avian collectives.

Painted Bunting (*Passerina ciris*)

Photo: Mary Caswell Stoddard.

My favorite bird is the Painted Bunting. It is an exuberantly colorful songbird. Males have a blue head, red belly and bright green back, while females are a uniform green. After flipping through the Peterson Field Guide to Eastern Birds of North America — a gift I received for my twelfth birthday — I longed to see a Painted Bunting in the wild. It would be many years before I finally spotted one at Corkscrew Swamp Sanctuary in southwest Florida, which is still one of my special birding spots. It was a dazzling male — an explosive pop of rainbow color against the green saw palmettos. In college, I researched bird color at the Yale Peabody Museum of Natural History. Birds have even better color vision than humans do. We have three color cone types in our retinas, sensitive to blue, green and red wavelengths of light, respectively. Birds have a fourth type sensitive to ultraviolet light. Using a spectrophotometer, I measured the colors of a male Painted Bunting specimen in the museum collection. I discovered that the Painted Bunting's green back is actually *ultraviolet-green* — a color we humans can only imagine. The Painted Bunting appears even more colorful to other birds than it does to us, a powerful reminder that the sensory experiences of many animals are very different from our own.

Mary Caswell Stoddard is an Associate Professor in the Department of Ecology and Evolutionary Biology at Princeton University. Her research explores bird coloration, bird color vision and bird eggs.

Tawny owl (*Strix aluco*)

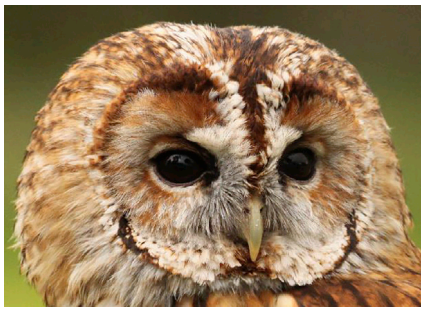

Photo: Graham Martin.

Wise owls have been with me all my life. They fascinated me as a child: adventures with my father at midnight in a local wood. They fascinated me as a budding scientist: my doctoral work trying to understand their vision. They fascinated me during my post-doctoral years: trying to work out how they managed to conduct their lives in that most challenging of habitats, a closed canopy woodland, at night. They taught me that there are no simple answers in sensory ecology, no super sense explanation of how owls gain and use information. Instead, a mix of vision and hearing operating at their limits, and the information that they provide integrated to guide specific behaviours in specific habitats and locations. My first tawny owl (see photo) came from a zoo, slightly damaged, but able to perform an array of tasks that I set up to probe its vision: running towards striped patterns to test acuity, pressing levers to investigate colour vision, or to determine the lowest light level that it could see. We spent a wonderful time together, mainly in the quiet dark. The tawny worked patiently for food rewards while I manipulated the stimuli that posed questions about what it could see. Altogether I worked with more than a dozen owls, but the first one was the longest lived. Once retired from science, it lived at home with me. By the time it died, we had been

together for 27 years. Not a longevity record for a captive tawny, but close to it, a life dedicated to science followed by a long and well-deserved retirement.

Graham R. Martin is Professor Emeritus in the School of Biosciences at the University of Birmingham, UK, where he studies the sensory ecology of birds and applies that knowledge to problems of bird collision and entrapment mitigation.

White stork (*Ciconia ciconia*)

Photo: Christian Ziegler.

Gruffalo, Pippi, and Hotzenplotz are not just characters in children's books. They are also the names of research animals, roaming around the world. I study the migration behavior of white storks using tracking devices, and I name them after the characters of the books that I read to my kids at night. Scientists often hesitate to name their research animals because it is anthropomorphic and may potentially influence data collection. But I have always seen it as a way of connecting with them, caring about them, and also protecting them. The lives of our research animals can be followed by everyone, using the mobile phone App Animal Tracker. It is so much easier to excite people about wildlife and the needs of nature when they can connect with it. People (and I) do not expect the stork to behave like its namesake, a fearsome robber, but they might be touched when Hotzenplotz dies on a malfunctioning electricity pole during migration. They might become interested in biology when little Pippi, only a few weeks old, flies thousands of kilometers to Africa. Their names create interest, they remind us to value other species — and they remind me how time goes by.

Andrea Flack is head of a DFG-funded junior research group at the Max-Planck Institute of Animal Behavior in Konstanz, Germany. We explore the impact of the social environment on migratory decision-making in birds and their long-term ecological and evolutionary effects.

Great egret (*Ardea alba*)

Photo: Douglas Mock.

I have been a student of bird behavior for a half-century and can say without hesitation that the single most remarkable thing I have seen is great egret parents standing at their nests seemingly disinterested as one of their newly hatched nestlings is pecked mercilessly by its siblings. In roughly one-third of all broods, the youngest chick dies from the cumulative effects of these beatings and the food-deprivation they enforce. This pattern of parental *laissez faire* became apparent immediately when I started studying siblicide in 1978 and had boldly predicted both that fighting would occur and, pointedly, that the parents would actively protect the victim — because, after all, they had produced all three offspring. I was dead wrong! Over the next two summers, my team and I recorded nearly 3,000 such incidents and parents did nothing — even accidentally, like tripping on top of the brood — to stop the fights in over 99% of them. This was so counterintuitive that I did not believe it at first, but invented various increasingly clumsy arguments to preserve the heart-warming assumption that parents don't play favorites. Maybe this season was unusually bad for fishing, such that the parents' 'normal' protective nature would manifest itself next summer? Eventually, it became obvious that parents at some of the nests were having a terrific season of fishing and delivered all the food their brood could ingest, but they didn't stop the fights either. Eventually, I came to understand that the dominance hierarchy was engineered by the parents' incubating early, so they had created the very asymmetry that my sentimental brain was expecting them to neutralize. I realized that the dominance hierarchy was part and parcel of their overall strategy for producing the largest number of affordable offspring. Parental care, like everything else in biology, is frequently unfair.

Doug Mock is a Professor Emeritus at the University of Oklahoma, USA. He works on within-family social dynamics in a variety of bird species.

Silvereye (*Zosterops lateralis*)

Photo: Tama Robertson.

Silvereyes have been a constant feature in my academic career and before. As a youngster, I attended a "Bird Week" on Heron Island on the Great Barrier Reef, where the late Professor Jiro Kikkawa ran his long-term study of silvereyes. During my University studies, Jiro taught ethology using winter dominance in silvereye flocks, which lead me to research silvereye vocal mate recognition. Then with sperm competition and DNA fingerprinting becoming key foci of behavioural ecology, I investigated the mating system of Jiro's silvereyes. Heron Island silvereyes are unusual amongst birds, as they display no extra-pair copulation or, as it turned out based on my genetic

analyses, no extra-pair paternity. Following a shift to conservation genetics and New Zealand, I returned to silvereye research to examine the role of animal personality in speciation. Silvereyes are a 'great speciator' — the genus *Zosterops* has about 100 species, but present a paradox as they are also great dispersers, and dispersal can hinder speciation; silvereyes self-colonised New Zealand from Australia in the 1830s, a distance of 3000 km. We are continuing to use genomic analyses of silvereyes to try and resolve that paradox.

Bruce Robertson is Professor at the Department of Zoology at University of Otago in New Zealand, where he researches genetics and wildlife management, contributing to the conservation of some of New Zealand's most endangered species.

Eurasian dotterel (*Charadrius morinellus*)

Photo: Terje Lislevand.

It is August 25th 2019, 6 AM. I'm driving a battle-scarred Landrover down a precipitous, winding dirt road in northern Italy. With me are three of the finest field assistants. Despite having been on the grass-and-rock slope of the 2500 m mountain since 7 PM the previous day, tiredness has not quite set in. In an adrenalin-fueled team effort, using night-vision binoculars, a strong flashlight and a net, we managed to catch another dotterel, putting the tally at nine. The Eurasian dotterel belongs to the rare category of polyandrous, sex-role reversed birds. Dotterels breed in arctic or subarctic tundra in Scandinavia and Siberia, but also on mountain plateaus in Scotland and in the Alps (for impressions see: https://youtu.be/1XSpmHOumN0). We learned about one of their favorite stop-over sites during fall migration in the Italian Dolomites from local aficionados of this enigmatic species. One of them is Maurizio, a policeman. Every day in late summer, before or after work, he drives an hour from his home and walks another half hour up the mountain to look for and after his favorite birds. Maurizio is the gentlest fellow you'll meet up there and he fits perfectly among these quiet, unsuspecting birds. Not so kind people gave the species its name, which simply means 'fool'. But who are the fools? In past years, local bird ringers caught more than one hundred dotterels and individually color marked them. None of them were ever seen again. Now, by attaching a 2-gram satellite transmitter on their back, we learn where they go and why they have such low site fidelity. Will their nomadic manners help these charming birds survive in a rapidly changing environment?

Bart Kempenaers is a behavioral ecologist and director of the Max Planck Institute for Ornithology in Seewiesen, Germany. He studies the behavior of his favorite shorebirds all over the world.

Rufous hummingbird (*Selasphorus rufus*)

Photo: T. Andrew Hurly.

A flash of neon orange, a bee-like buzz, and a fly-past like a miniature Top-Gun chase: a male rufous hummingbird defends his territory in the Westcastle valley, southern Alberta, Canada. Along with friend and colleague Andy Hurly and a fine group of junior researchers, I have spent nearly three decades finding out what these birds learn and remember, as they forage at our artificial 'flowers'. All the while, a male is on the lookout for females to mate with and rivals to best. These boys are gorgeous, feisty and without a care for human proximity: I have never tired of just watching them, let alone trying to ask them Dr Dolittle-like questions. I delight when they respond as predicted, and find even more pleasure in trying to figure out what they are 'saying' when they do not. For an enthusiast of animal behaviour, all the boxes are ticked: a charismatic animal, regular (around every 10 minutes) very close encounters and a feeling that we have learned (and continue to learn) something of what 'they're about'. And then marvel some more: tiny birds, with capacious cognitive abilities, utterly worth the snow, the rain, the heat, the mosquitoes.

Susan Healy is a Professor at the University of St. Andrews, Scotland, where she works on animal cognition especially foraging in wild hummingbirds and nest building in a wide range of bird species.

Rock Pigeon (*Columba livia*)

Photo: Ivo Ros and Andrew A. Biewener.

Over my career I have grown to appreciate the elegant and impressive flight performance of common pigeons, also known as Rock Doves. Pigeons constituted one of Darwin's principal species of study, recognizing that artificial selection on pigeons could modify their form, including their flight performance, most clearly demonstrated by a variety of tumbler

and roller pigeons. Originally adapted to roost and breed on cliff faces and rock ledges, pigeons have spread worldwide, demonstrating their successful adaptation to human-made urban landscapes. As a result, pigeons are often considered a nuisance. However, closer examination of their flight and feeding behaviors reveals adaptations for highly maneuverable flight and gaze stabilization while foraging for food on the ground. Although temperamental and poorly performing when asked to fly in a wind tunnel, pigeons excel when trained to fly between perches and to carry out navigational tasks (as well as long distance communication prior to electronics). Their tractable and friendly nature has allowed us to study how they generate aerodynamic forces for turning and maneuvering, which also requires control of head motion for gaze stabilization during flight, as well as their ability to generate lift during both the downstroke and upstroke of slower speed flight, an ability only recently recognized that is shared by hummingbirds and other species, such as kestrels, that can hover in place. I am confident they will continue to reveal novel scientific findings to fascinate us.

Andrew A. Biewener is Professor of Biology at Harvard University and interested in how the neuro-musculoskeletal systems are structured and operate to power and control flight in birds.

Darwin's finches (Geospizini)

Photo: Jeff Podos.

A group of birds that is particularly meaningful to me are the Darwin's finches of the Galápagos Islands, Ecuador, which I have had the privilege of studying during 15 field expeditions. Darwin's finches are a well-known 'adaptive radiation', in which a single ancestral species diverged in fairly short order into multiple descendant species. Darwin's finches occupy diverse feeding niches across the Galapagos archipelago, and accordingly have diverged widely in beak form and function. The Vegetarian finch (*Platyspiza crassirostris*), for instance, uses its stout, parrot-like beak to feed on diverse components of plants including leaves and nectar squeezed from flowers (see photo). What I personally hadn't appreciated before starting field work is the staggering extent to which the different species actually vary in their overall sizes, diets and beak forms and functions. Let me qualify that statement: I knew about the variations from the literature, but to see and study how these birds live, in their natural habitats, is something else altogether. Ultimately, this variation illustrates the power of evolution and its capacity to generate biological diversity.

Jeff Podos is Professor of Biology at the University of Massachusetts Amherst, where he and his lab group study behavioral ecology and acoustic communication, with an emphasis on vocal signaling in birds.

Rhinoceros Hornbill (*Buceros rhinoceros*)

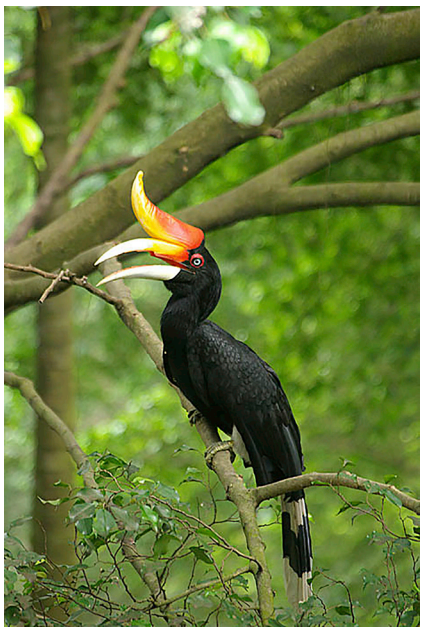

Photo: Stefan Fussan/Wikicommons (CC BY 2.0).

In 2012, I achieved a dream of mine, which was to see wild rhinoceros hornbills. It was dawn in Danum Valley, in the Sabah region of Malaysian Borneo, and the target species for that morning were actually Bornean gibbons (*Hylobates muelleri*). We'd seen five species of hornbill the day before, but so far, rhinoceros hornbills — the largest of the Bucerotidae group — had eluded us. My fascination with hornbills went a little beyond their exotic look and stunning plumage (and they truly are stunning!); I was fascinated by their breeding and moulting biology. Hornbills are the only birds where the males and females have different moult strategies. To keep the female, eggs and young safe from predators, females are blocked into a tree cavity via a mud wall constructed by both parents, and she is then fed by the male through a tiny gap left in the wall. During this period, the female undergoes a simultaneous flight-feather moult, where she drops all her flight feathers and becomes flightless. The male experiences a more typical sequential flight-feather moult, losing one feather at a time from each wing, symmetrically. While I was never going to see a moulting female, that morning we did get to watch as a male rhinoceros hornbill passed berries and a small lizard through the hole in the mud wall, to the incubating female waiting inside. A magical experience I will never forget.

Steven Portugal is a reader in Animal Behaviour and Physiology at Royal Holloway, University of London. As a comparative ecophysiologist, his research is located at the interface of the physiology, sensory ecology and behaviour of vertebrates.

Audubon's warbler (*Setophaga coronata auduboni*)

Photo: David Toews.

Much of my graduate research was focused on Audubon's warblers, a

subspecies of yellow-rumped warbler (affectionately called “butter-buts” by birders). Audubon’s are distinguished from their cousin, Myrtle warblers (*Setophaga coronata*), by their bright, yellow throat, and they will always have a special place in my heart. They haven’t always been so familiar to me, however. For example, when beginning my fieldwork, calling me “green” would have been — generous. I was working in the sky island forests of the southwestern USA, but I had no idea how to find Audubon’s warblers. I obtained permits for parks they didn’t occur in. I visited habitats they clearly didn’t live in. I ashamedly cursed their names some mornings! But, in time, I started to catch on. Particularly at sites above 9000 feet, Audubon’s warblers were abundant, singing regularly from dense thickets of tall ponderosa pines. These habitats were especially wonderful given their broader context: you can drive from the white sand dunes near Alamogordo, New Mexico to the Lincoln National Forest in less than an hour, but enter a totally different world. Those 9000 feet of elevation transported me back to the deep, dark forests, like those in boreal Canada. Audubon’s warblers here were wily and sometimes difficult to convince to fly into my mist nets, but when they did, it was always a thrill. A handsome, colorful, and, as it turns out, an evolutionarily complex warbler — Audubon’s are where it all began for me.

David Toews is an Assistant Professor in the Department of Biology at Pennsylvania State University, where he studies the evolution and ecology of birds — mostly small songbirds — often using genomic tools.

Eurasian Blackbird (*Turdus merula*)

Photo: Luiz Lapa/Flickr (CC BY 2.0).

Not long after I moved from Canada to Amsterdam to study composition, I was awoken in the wee hours of the morning by a breathtakingly beautiful birdsong, sung against a gentle backdrop of wind and rain. I was sure that it must be a nightingale, but friends told me that it was it was a common blackbird instead. (I still don’t understand why the song of the nightingale is more famous than that of the blackbird — I find the blackbird infinitely more enticing!) I was fascinated by how short fragments of what the blackbird sang sounded very much like human music, yet I would never mistake the entirety of its song for something composed by a person. I wrote a piece, *night black bird song*, which explored differences between how a human and a blackbird might arrange the same set of musical motifs. At the time, I thought that that would remain my one birdsong piece, but instead that blackbird set me on a path that I’m still exploring 25 years later. Over the years I’ve written pieces based on the songs of Hermit Thrushes, American Goldfinches, Pied Butcherbirds, and many others, but I hadn’t revisited blackbird song until the first Covid lockdown, when a wonderful singer took up residence in the tree outside my window. I had initially fallen into a pit of despair and felt unable to concentrate on anything: not my music, not my research, not the world around me. Transcribing the song of that blackbird, as well as of the other birds that came to my garden, became my daily practice, and gradually helped me reconnect with myself and to find pleasure and fulfillment in engaging with the world again.

Emily Doolittle is an Athenaeum Research Fellow and Lecturer in Composition at the Royal Conservatoire of Scotland, and co-founder of SHARE (Science, Humanities and Arts Research Exchange), which facilitates interdisciplinary collaborations between artists and researchers in Scotland.

Northern Cardinal (*Cardinalis cardinalis*)

Some 25 years ago, my friend Ole Larsen and I were attempting to film the songbird syrinx in action. For a long time, the thin medial membranes were thought to be the sound source. We succeeded in getting images of the phonating syrinx, and they showed

Photo: Rhododendrites/Wikicommons (CC BY-SA 4.0)

small pillows of tissue, the labia, vibrating. The labia obstructed view of the membranes below, so we needed an experimental manipulation to exclude them as a sound source. Our first bird for this test was cardinal 143, a male raised by me two years earlier, who still begged for mealworms every time I entered the room. We performed the surgery to ablate the membranes, and after the final stitch in the skin we kept the bird warm to let him wake up from anesthesia. It would probably take a few days for him to recover and feel like singing again. Would he then be able to sing without the membranes? As I held cardinal 143 in my hand and in the transition to full consciousness, he sang a soft, but distinctive song. What unexpected, early confirmation that the labia are the main sound source! After that, cardinal 143 kept singing in well-earned retirement.

Franz Goller, who studies the syrinx, is Emeritus Professor of Biology at the University of Utah and an adjunct Scientist at the Institute of Integrative Cell Biology and Physiology at the University of Münster.

Woodpeckers (Picidae)

I have an abiding passion for woodpeckers, like the depicted male Bearded Woodpecker (*Dendropicos namaquus*). Woodpeckers exhibit fascinating trends in morphology and movement across a diverse array of small to medium body sizes. As the

Photo: Bret W. Tobalske.

percentage of time spent excavating in wood for food increases, evolution appears to have selected for stouter, broader-wedge shaped bills, increased mass of muscles and ribs of the trunk and a shorter tarsometatarsus thought to enable the bird to more effectively pivot to use more of its mass when excavating. Woodpeckers are prime examples of birds that use flap-bounding, a form of intermittent flight consisting of flapping phases interrupted with flexed-wing bounds. Charismatic outliers, especially the Lewis's Woodpecker, regularly glide like swifts or swallows. My experience working as a carpenter before graduate school and my enthusiasm for bicycling motivated me to study the intermittent flight of woodpeckers. Framing houses using lumber, reasoning that humans and woodpeckers compete for this resource, first led me test the effects of timber harvesting on nesting success in Red-naped Sapsuckers. I rode a mountain bike to and from my field site. The sapsuckers flap-bounded to and from their nests. I soon learned of a 'fixed-gear' hypothesis that compared flap-bounding to riding with only one gear optimized for maximal power and coasting whenever less power was required. Uncovering evidence that was not consistent with this hypothesis defined my doctoral dissertation and launched my career. I am always drawn to these birds.

Bret Tobalske is a Professor in the Division of Biological Sciences at the University of Montana and Director of the Field Research Station at Fort Missoula. He studies the biomechanics of animal motion in fluids.

Jeholornis

Photo: Zheng Xiaoting.

My bird is *Jeholornis*, the only definitive Cretaceous bird with a long bony tail. Surprisingly, its tail is proportionately longer and consists of more vertebrae than that of *Archaeopteryx*, the only known Jurassic bird. Despite this seemingly primitive characteristic, *Jeholornis* has a very derived flight apparatus including a well-developed procoracoid process on the coracoid and a curved scapula, features otherwise restricted to the Ornithuromorpha (the clade that includes crown birds). The discovery of specimens revealing an unusual two-tract tail plumage suggests that the elongate tail is part of *Jeholornis'* derived flight apparatus. It serves as a stabilizer all the more effective for its length, which increases the moment arm of pitching forces imparted by the distal tract of feathers when the tail is raised or depressed. It also may have been one of the earliest fruit-eating birds and its diet is likely to have changed with the seasons, utilizing gizzard stones when not consuming fruit. Helping to uncover this information from the fossil record of this strange bird has been incredibly rewarding and earned it a special place in my heart.

Jingmai O'Connor is the Associate Curator of Fossil Reptiles at the Field Museum of Natural History. Her research focuses on the dinosaur–bird transition and the evolution of modern avian physiology.

Carrion Crow (*Corvus corone*)

As a child I had spotted the drawing of a crow in a store and threatened a tantrum lest my parents by it for me. I still have the picture, reminding me of how a

Photo: Alexis Lours/Flickr (CC BY 2.0).

crow's black eyes look curiously — and maybe a little provocatively — at the world and I imagine their brains hard at work. When later hand-raising my first crows as a postdoc I soon realized how challenging they can be. The crows needed food late at night and early in the morning, made a mess when learning to fly or when hiding food, ideally raw chicken, and they demanded to fall asleep on my arm. Yet, this proximity to humans didn't stop them from challenging me later or from developing odd traits, such as neophobia, which still renders them unwilling to work if I wear the wrong T-shirt. But I also will never forget when, during initial peck training, I showed my bird how to respond to a touchscreen by touching it with my finger. After observing me for a while he carefully took my finger into his beak to then touch the monitor with my finger — rather than his beak — and receive his reward from the feeder.

Jonas Rose is a Professor in the Department of Psychology at Ruhr University Bochum. His research explores the neural basis of bird cognition.

Carrion Crow (*Corvus corone*)

One summer, my friend came over and asked if I could take care of the crow they had rescued earlier that year. Not clear what 'taking care' meant, the bird seemed self-sufficient and free. I nonetheless loaded a feeding station with meat outside the bedroom window of my late grandmother. Soon, the bird turned up. His (sex uncertain) name was Jacques or Jack, which in my Bavarian vernacular became something like 'Tschack'. Tschack kept coming and reluctantly let me touch him while feeding, but one day

Photo: F.X. Maderspacher.

he just landed on my outstretched hand. Growing up on the fringes of a Bavarian village, my father and my uncle always had kept all sorts of semi-wild rescue animals: roe deer, marten, a buzzard and once even a fox, later poisoned by a malevolent neighbor. I had pet frogs and fish and ducks and rabbits. But crows were different. Every night, a huge black swarm rose from the village rubbish dump to roost. When we shot a deer, they arrived within minutes from the sound alone. Tschack was true to character. Sometimes he would not show up for days, then he would fly in, land on my head and peck my ears. He sat on my shoulder and rode the bike with me, perched on the crossbar. In private, he would sometimes look me in the eye, his head tilted, eyes flickering. My uncle, never short of nutty ideas, suggested to make him talk by severing the attachment of his tongue, as though some spirit within him longed to be liberated. Tschack remained silent, secretive and anarchic, like when he pulled out freshly sprung seedlings or meticulously unclipped my mother's clothespins, sending her laundry into the dirt. This playful curiosity was his undoing. Before the summer went out, he was dead. Someone had put out poison — if meant for snails or for him, we never knew. But I knew I had done something terrible: made him forget that humans cannot be trusted.

Florian Maderspacher is *Current Biology*'s Senior Reviews Editor.

Sulphur-crested Cockatoo (*Cacatua galerita*)

Photo: John Martin.

When I went back to my field-site after over two years of Covid-caused absence, it was with little hope that the Sulphur-crested Cockatoos we study would have retained their habituation. But I spread some bird-seed on the ground, sat down and gave our signature 'come here' whistle we used to census roosting-groups. Almost immediately in flew wing-tag no.11, aka 'Watermelon', gliding down to land heavily with the grace of a cargo plane and then waddling over as fast as his short parrot legs could manage. Perhaps I shouldn't have worried; we often joke that cockatoos seem to have memories like elephants, and his is probably the longest. First auspiciously tagged as an adult on 11th November 2011, no.11 is a fixture of our study. He is central in the local cockatoo social network, high in the dominance hierarchy, and has bred for at least a decade with his mate in a large gum-tree overlooking Sydney harbour. Our citizen science programme shows us that he is also a favourite with local residents. Over the last decade he has been recorded visiting balconies for handouts on both sides of the harbour across Sydney's best-known neighbourhoods, often with this year's offspring in tow. Indeed, I think I'm just one member of the Watermelon fan-club; he has become an ambassador for our project and is a demonstration of just how successfully some animals can live and thrive in our urban spaces.

Lucy Aplin is an ERC Professor at the University of Zurich, and a senior lecturer at the Australian National University. She leads the cognitive and cultural ecology research group, studying how new behaviours can emerge, spread and establish in populations of birds.

Scaled Ground-Cuckoo (*Neomorphus squamiger*)

Photo: Joao Quental.

I can only remember shaking uncontrollably after seeing a bird thrice; once on finding a vagrant Red-eyed Vireo (*Vireo olivaceus*), a tiny songbird that had just crossed the North Atlantic; once when a Harpy Eagle (*Harpia harpyjal*) glared down at me from a nest and once on encountering an enigmatic denizen of the southern Amazon. On 7 June 2003, I was birding alone along the Rio Cristalino in Mato Grosso, Brazil, when I heard some loud clacking noises reminiscent of the tooth-chomping noises of White-lipped Peccaries (*Tayassu pecari*). I was little prepared for the rush of adrenalin when a Scaled Ground-Cuckoo appeared right in front of me — an odd-ball forest roadrunner, one of the most sought-after and most poorly understood of all Neotropical birds. I was transfixed by the tear drop of pale blue skin behind its eye as it nervously flicked its tail, before scuttling off into the oblivion of the understorey, leaving me with a sound-recording and an indelible memory. Nearly 20 years have passed and despite thousands of hours of fieldwork I have never seen another ground-cuckoo. Systematists

still struggle with the taxonomic treatment of the group, as it becomes increasingly apparent that they are acutely threatened by global change. Ground-cuckoos need large areas of primary rainforest where the army ants and peccaries they follow can thrive. Indigenous peoples often know them as 'pig-cuckoos' and recent research suggests they may even be acoustic mimics of peccaries (https://doi.org/10.1111/jav.01266). Ground-cuckoos must still keep many secrets.

Alexander Lees is a Reader in conservation biology at Manchester Metropolitan University working on the ecology and conservation of birds, especially in the Amazon basin.

Great Crested Grebe (*Podiceps cristatus*)

Photo: Kevin J. Gaston.

I became obsessed with nature at a young age, much I suspect to the bemusement of my parents, who had no such fascination. As an engineer, my father did, however, know the value of data. When at the age of eight or so I expressed interest in the Great Crested Grebes on the local gravel pit, he encouraged a weekly count of their numbers. For the following year, we visited every weekend and kept updated a graph that eventually revealed the wintering population to be much greater than the breeding one. I have had a passion for grebes ever since; it took a few decades between my boyhood awe of Great Grebe (*Podiceps major*), the largest species, from looking at pictures and my seeing them in the wild for the first time. Local ornithologists got to hear of me and my graph and generously introduced me to interesting birds in our region, giving me access to sites where they could be found. I have spent much of my subsequent career working on the rarity and the commonness of birds.

Kevin J. Gaston is Professor of biodiversity and conservation at University of Exeter, where he presently conducts research into common ecology, nighttime ecology and personalized ecology.

Whooping crane (*Grus americana*)

Photo: U.S. Fish and Wildlife Services/Flickr (CC BY 2.0).

In high school in Dallas, Texas, I was a dedicated bird watcher with the local Audubon Society. I also brought dead birds home, put them in the kitchen freezer, annoying my mother in the process. I then started making study skins, all before a federal law was passed prohibiting people from having a private collection. One day, while in class in high school, a secretary looked in the door and said I was wanted in the principal's office. What had I done? When I got there, my parents were sitting with the principal! Yikes! Almost immediately, the principal said my parents were taking me out of school to join some Audubon people on a field trip to the Rio Grande valley, leaving right away. So off I went on a long road trip to a premier birding spot in North America. There I saw my first majestic Whooping Crane, of which there were only around 30 living individuals at the time — my first threatened and endangered species, and one of the very rarest in the world! The entire experience left many threads in my life.

Joel Cracraft is Curator-in-Charge of the Department of Ornithology at the American Museum of Natural History, New York City. His research interests are bird systematics, biogeography, diversification and global environmental change.

Giant Cowbird (*Molothrus oryzivorus*)

Photo: Bernard Dupont/Wikicommons (CC BY 2.0).

In graduate school, I studied behavior of brood-parasitic Brown-headed Cowbirds in Kansas. I analyzed polymorphic proteins in cowbird eggs to identify individual females and showed that they had no preference for specific host species. I later became interested in a tropical relative, the Giant Cowbird, which is three to four times larger than other cowbird species and almost always parasitizes nests of oropendolas and caciques. These large icterid hosts often nest high in trees, near wasp or bee nests to gain protection against predators. In 1986, I went to the Smithsonian Tropical Research Institute in Panama to apply similar protein methods to learn what I could about Giant Cowbirds and their hosts, especially the possibility of egg mimicry. The fieldwork was grueling — most nests were high up in trees and could only be reached with a cherrypicker (generously provided by the US military). And then there were the wasps, which occasionally necessitated use of Benadryl or an inhaler. I found unique protein markers for each species and used these and multivariate analysis of egg measurements to discover that Giant Cowbird eggs differed from host eggs. And that when two cowbird eggs were found in the same nest, at least half the time they were laid by different

females. I would love to repeat the research with DNA — and protective equipment — someday.

Robert Fleischer is senior scientist and head of the Smithsonian Conservation Biology Institute's Center for Conservation Genomics where he researches conservation and evolutionary genetics, systematics, and molecular and behavioral ecology, mostly on vertebrates and their pathogens.

Great Tinamou (*Tinamus major*)

Photo: Raul Fournier.

After a couple of years of studying Great Tinamous in the tropical forest of Costa Rica for my PhD, I finally saw a full mating. The female crouched on the ground soliciting to the male who awkwardly stood on top of her back threading carefully. She lifted her cloaca and he lowered his and they came into contact. So far everything looked like any other bird mating, except that suddenly she stood up and the male remained attached, grabbing her by the neck feathers with his beak. They walked a few steps attached to each other, and when they finally separated, I saw a weird organ hanging from his cloaca. At first, I thought it was a parasite! It was white and curly and thin, but then the male started pulsing his cloaca and the organ was retracted. It was then I realized that this was a penis. I had never heard that birds had penises so I was surprised, especially because I was studying the great tinamou mating system. When I returned from the field, I decided to look into what we knew about bird genitalia and realized there was very little known about them. This field observation changed the direction of my career and led to new discoveries I could have never imagined.

Patricia (Patty) Brennan is an Associate Professor in the Department of Biological Sciences at Mount Holyoke College. She studies the evolution of female and male genitalia in vertebrates.

Greater Honeyguide (*Indicator indicator*)

Photo: Claire Spottiswoode.

In the vast miombo woodlands of the Niassa Special Reserve in northern Mozambique, people and wildlife not only coexist, but also cooperate. Wild honey is a treat in good times and a saviour in bad, and to find it, people rely on the sego, the Greater Honeyguide. On my first ever honey-hunt here, in 2013, I followed Orlando Yassene as he walked and called to let any sego know he was eager to cooperate: Brrrrr-hhm! A female sego flew to us and chattered insistently to indicate that she was, too. She and Orlando exchanged chatters and Brrrrr-hhms, as he followed her, and I him, to the sandy bed of the Mpopo River, where she paused and changed pitch to indicate where a bees' nest lay in a riverine tree. Orlando lit a fire and chopped open the trunk to harvest the honey, then I netted the segos that came to join in the beeswax leftovers. To one male I fitted two red rings. This individual, 'Red Over Red' proved to be our study area's most ardent guide and we caught him again many times at the honey harvests he enabled. He, Orlando and I met one another most years; two guides and two followers. I write this from Niassa, and Red Over Red hasn't come to us this time. But his conversations with Orlando are echoed here daily, as other segos and their followers exchange information for skills. We need to protect remarkable places like Niassa, so birds can continue to collaborate with us to mutual benefit.

Claire Spottiswoode is a Professor at the FitzPatrick Institute of African Ornithology at the University of Cape Town, where she studies the coevolution, ecology and conservation of species interactions, both mutualistic and parasitic.

Black-footed Albatross (*Phoebastria nigripes*)

Photo: Scott Edwards.

On my office wall, I have a three-by-four-foot photo I took as a student of a Black-footed Albatross gliding over the coral blue waves of what is now Papahānaumokuākea Marine National Monument in the Northwest Hawaiian Islands. (The photo, big as it is, still doesn't do justice to its real-life seven-foot wingspan). The species' name refers to its prominent webbed feet, a trait found throughout the tube-nosed seabird clade Procellariformes; in this particular species they are jet black. Albatrosses are among the most majestic of birds, inspiring famous poems and easily traversing thousands of miles across whole oceans in search of food or nesting sites via an extremely energy-efficient process called 'dynamic soaring'. But the Black-footed Albatross' name doesn't begin to convey the beauty of its plumage, bill and eyes, all of which are a dark chocolate brown — the same color as my skin. As one of the only African American professional ornithologists, 'black-foots' remind us that our profession, and the life sciences in general, still have a long way to go in realizing the talent of all the diverse people who could be making the next big discovery.

Scott Edwards is the Alexander Agassiz Professor of Zoology and Curator of Ornithology in the Museum of Comparative Zoology, Harvard University. His research touches broad aspects of the evolutionary biology of birds and other vertebrates.