HOW BIRDS EVOLVE: WHAT SCIENCE REVEALS ABOUT THEIR ORIGIN, LIVES AND DIVERSITY

FUTUYMA, DOUGLAS J., 2021. Princeton University Press, Princeton, NJ. 269 pp., 19 B&W illustrations, 48 colour plates, 42 graphs and charts (many with additional artwork) and three maps. Hardcover: ISBN 978-0-69-118262-9, US$29.95. Ebook: ISBN 978-0-69-122726-9.

How Birds Evolve is an extraordinary compendium of different studies relating to the evolution of birds. The author is a distinguished researcher on evolution, as well as a keen ornithologist, with an interest in every aspect of avian ecology and behaviour. The book covers the evolution of birds from early dinosaurs and traces the relationships of the major groups, using the latest information. However, it is more about the causes of evolution than the consequences, so chapters are devoted to variation, adaptation, life history strategy, sexual selection, social behaviour, speciation, biogeography, and extinction. Each topic is built around particular avian studies, most of which are described fairly briefly, providing just the information necessary to make the point they are illustrating.

The text is dense with the latest research findings and gives an excellent introduction to some of the methods currently being applied to the study of avian evolutionary biology, especially those relating to DNA analysis. Consequently, the book covers a huge range of research—the author's comprehensive knowledge of the ornithological literature is extremely impressive. Some rather obscure tid-bits are included: I have studied seabirds for 50 years and written a book on their biology and this was the first time I heard that petrels could move food back from the intestine into the gizzard to aid in lipid digestion! Following up the literature on this topic suggested that the generalisation is based only on nestling storm petrels (Duke et al. 1989). It would be very interesting to know if this is typical of procellariforms. In addition, I was delighted to be introduced to studies of Wild Turkeys *Meleagris gallopavo* that demonstrate that pairs of courting males carrying out synchronised displays tend to be brothers, another phenomenon of which I was previously ignorant.

The amount of detail devoted to different topics varies, understandably. For instance, in discussing the ability of Bar-headed Geese *Anser indicus* to fly over the Himalayas, a very detailed description is provided of mutations that cause variation in respiratory ability in birds (p. 93), a topic that I would have thought rather marginal. On the other hand, the topic of flocking among unrelated individuals, common to many bird species, gets rather short shrift, with no mention at all of the information centre hypothesis. Generally, I found the description of genetics and selection more detailed and informative than those of behaviour and life-history, presumably reflecting the author's major interests. However, overall, the level of detail and accuracy provided is excellent and the book makes a fine primer for avian evolution.

Given the enormous range of studies covered in the book, it is hardly surprising that a few errors have crept in: the blue morph of the Snow Goose *Anser caerulescens* is said to be commoner farther west (p. 77), the opposite of the real distribution; 'sucrose' on p. 92 should be 'sucrase' (that could be an autocorrect error); newly hatched megapodes have "fully developed wings" (p. 109); and on p. 125 it is implied that European Robin *Erithacus rubecula* is dimorphic with brighter males (not!). These are all trivial, but there is one area where I definitely disagreed with the author, when he equated lifetime reproductive success with fitness (twice). This is a widespread misapprehension which probably persists because most people think only of small passerines that all start breeding at one year old. Once we get to species with deferred breeding the situation is a lot more complex. The error was especially puzzling because he gets it right at p. 58 where he defines fitness as "*the average difference in rate of reproduction*" (not lifetime reproduction).

Seabird researchers also might disagree with his assertion that slow-fast life history variation is determined by the likelihood of extrinsic mortality (p. 125). No mention is made of the potential role of foraging range and food competition in colonial species. Also, people living around the Great Lakes would be surprised to read that the author regarded Laughing Gulls *Leucophaeus atricilla* taking flying insects on the wing as an unusual behaviour for a gull. In eastern Ontario at least, that type of foraging is commonplace for Ring-billed Gulls *Larus delawarensis*. In fact, on balance, I felt that seabirds received less attention than they deserved: only 17 seabird genera are indexed, against 200 land bird genera. However, Ian Jones' work on the significance of ornamentation in auklets and Vicki Friesen's on sympatric speciation in storm petrels both get a shout-out.

The book is attractively illustrated with line drawings attached to many of the charts and sketches of some of the behaviours described. A collection of excellent colour photographs illustrate a selection of the species discussed, as well as giving a glimpse of the wide range of colour and form seen among birds. Production is excellent, although I do dislike an index where under "*Tyto alba*" it says, "see Barn Owl" - why not give the page reference in both places?

I found *How Birds Evolve* to be very readable and highly informative. It would be a great resource for students entering the field of vertebrate evolution, even those who have no special interest in birds. It can also be read with advantage by anyone studying avian behaviour, ecology or evolution. Out of ten, I give it nine and a half.

Anthony J Gaston, 174 Dufferin Road, Ottawa K1M 2A6, Canada
tonygastonconsult@gmail.com

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SEABIRDS: THE NEW IDENTIFICATION GUIDE

HARRISON, P., PERROW, M. & LARSSON, H. 2021. Lynx Edicions, Barcelona. 600 pp., 239 colour plates with 3800+ figures and maps. Hardcover: ISBN 978-84-16728-41-1, $90.00USD.

Peter Harrison has recruited a couple of highly qualified co-authors and updated his classic 1983 identification guide to seabirds, and the result is spectacular. This is an ambitious, graphically-intense guidebook to seabird identification illustrated with paintings by Peter Harrison (mostly) and Hans Larsson (Laridae and Stercorariidae). Three colour range maps are included for each species. Additionally, there are helpful breakout sections on identification of complex groups (e.g., prions, gadfly petrels etc.). The focus is seabird identification to species, with the traditional arrangement of species accounts and maps on left-facing pages and annotated colour plates on the right. At 1597 g, this is a big book, more something you'd keep in your cabin on a cruise ship holiday or keep as a reference at home, rather than something to flip through during a rolling pelagic day trip. This book will be of greatest interest to birdwatchers and biologists looking for an up-to-date desk reference on seabird species identification, and also to conservation biologists wondering about the current (2020) classification and identification of obscure and threatened populations.

The criterion for 'seabird' used here is mostly taxonomic rather than ecological—so in addition to salty seabird groups like petrels and alcids, freshwater cormorants, gulls, and inland grebes are also included, while duck coverage is restricted to the more extensively marine species. Effectively, this covers all seabird species and a few of their freshwater relatives, so I don't see this as an issue for most readers.

Regarding the artwork, this guide's illustrations are by two artists with decidedly different styles and approaches. Harrison's lively paintings have improved from his 1983 guide and his work is obviously still aimed to capture distinctive poses, behaviour, and 'jizz' of various species—in some plates approaching caricature or even impressionism. Once you get used to this distinctive style, I believe it is quite effective for identification purposes, especially for things like storm petrels and gadfly petrels at which he excels. To my eye, a few of Harrison's species' (e.g., northern fulmars and Sooty and Short-tailed Shearwaters) have plumage contrast with unnecessarily exaggerated light and dark feather edging, which is not ideal. Harrison's tropicbird artwork, although covering identification points adequately, leaves considerable room for improvement in terms of realistic depiction of these uber-charismatic ethereal species. Larsson's stunning artwork, in comparison, might best be described as hyperrealism, with some of his depictions resembling photographs. This lends itself well to his assigned species, the realism and detail certainly helpful for capturing age and other subtle differences in gull, jaeger and skua species.

The species account and breakout section text is detailed, readable, and accurate. In addition to its main focus on identification information, this book has concise and well-written summary details about behaviour, habitat, diet, timing of breeding, range, and conservation status included in the species accounts. This information is referenced to represent recent publications in the scientific literature that are well-selected, presenting a mostly up-to-date summary of what is known. The only thing I found lacking here was a more frequent description of preferred sea surface temperature (for birds at sea), which is known to be distinctive for many Procellariiform species. I like the range maps, these being remarkably detailed and accurate (to my knowledge) and compact size-wise, fitting nicely into the species accounts.

Classification of seabird taxa has been dynamic over time, and this volume reflects a take on the current trend of extensive splitting of forms into separate species, here based on the judgement and opinions of the authors, as well as generally agreed upon published science. Emerging information about similar forms is given extensive coverage and this seems to have been a major priority for this book. For example, various Herring Gull forms and relatives are given many pages of detailed coverage, exploring plumage variation both across subspecies and also age-related variation. The American and eastern Palearctic, versus the European and western Palearctic, Herring Gull types are grouped separately in text order, separated by six other species including e.g., Great Black-backed Gull and the white-winged gulls. How much gull information is too much gull information? This volume puts this question to the test. Controversially, 'Thayer's Gull' (which science indicates is a subspecies in the Iceland Gull group) and Iceland Gull are covered as separate valid species, with Kumlien's Gull covered as a hybrid of these two. A hybrid form, 'Olympic Gull' (Glaucous-winged Gull × Western Gull), of NW North America is usefully covered in detail. The gull coverage alone certainly does not make light reading, but if you are looking for detail, it is here. The small black-and-white shearwater group is covered as 20 separate species, several of which I had never heard of previously. Even the northern fulmars are split into Pacific Fulmar and Atlantic Fulmar. Coverage of recently described storm petrel species is detailed and accurate. Skua (*Catharacta* spp.) coverage is fantastically detailed in both text and graphics, which I found interesting, although skeptics will find some aspects of their identification to species as nebulous as ever. The classification presented is currently undergoing lively discussion, and will certainly be subject to change, but I don't see this as a weakness. For birders with an inclination to adding to their lists, this book will provide new species to tick off, but also presents splits of former species into multiple taxa often not readily identifiable in the field (e.g., *Hydrobates* storm petrels). For conservation biologists, this volume provides a banquet of food for thought on diversity, variation, and distribution (including currently emerging information about obscure and controversial taxa) of seabirds, which as a group has a disproportionately high number of threatened and endangered species.

Overall, this is an ambitious production containing a vast amount of detailed and accurate information with beautiful illustrations and maps. This book has, in my opinion, succeeded in all its aims and is a must-have for any scientist with a serious interest in seabird biology, ecology, identification, classification, and conservation.

Ian L. Jones Department of Biology, Memorial University, St. John's, NL, A1B 3X9 Canada, iljones@mun.ca

THE PUFFIN PLAN: RESTORING SEABIRDS TO EGG ROCK AND BEYOND

KRESS, S.W., JACKSON, D.Z. 2020. Tumblehome Inc., Boston, MA. 184pp. Hardcover: ISBN 13: 978-1-943431-57-1 $16.95

"Puffin…with fish!!!" These three words were, in the lead author of *The Puffin Plan* Dr. Stephen Kress' words, the most important of his career. They signified that his decade-long project to reintroduce Atlantic Puffins to Eastern Egg Rock, Maine was a success; they signaled breeding. But to myself and my two daughters reading *The Puffin Plan* together as a family, they represented an emotional, heartfelt, and downright funny climax of the book. After we read the chapter on the first breeding success at this newly restored seabird colony, we repeated that phrase over and over. We've also been chanting the words of excited research assistant Evie Weinstein, who broke radio protocol to exclaim to the local marine operator "Puffin with fish in its beak! Puffin babies on Eastern Egg Rock!" (the channel was supposed to be for emergency communications only). Honestly, we've still been repeating these phrases even a couple weeks after finishing the chapter.

The Puffin Plan summarizes the distinguished career of Dr. Stephen Kress, who pioneered methods to restore seabirds through social attraction and chick translocation. It is targeted to adolescents and young adults, hence this review being written by our family including one elementary- and one middle-school-aged kid. In the words of the youngest co-author of this review, this book is perfect for anyone who can read. Even though the target audience is adolescents and young adults, ornithologists and conservationists of any age or stage will undoubtedly find the tale of Dr. Kress' career engaging, exciting, and inspiring. How could they not with the stories of rejection from leaders in seabird biology, false starts, capsized boats, discarded and honed methods, and ultimately success that would spark seabird restoration projects across the globe?

Having collaborated with Dr. Kress on publications since my days as a PhD student and researched seabird islands and seabird restoration for nearly two decades, I knew the broad strokes of this storied seabird restoration project before reading *The Puffin Plan*. But in reading it, I was struck by how hard Dr. Kress worked to overcome the rejection of leaders in his field second guessing his work, the dedication of the team he amassed to help the project soar, and the countless young scientists that have been trained by Project Puffin. The anecdotes of Dr. Kress' interactions with folks who went on to be leaders in ornithology would draw in any student of history, as the descriptions of the Gulf of Maine islands would draw in any student of natural history.

The book starts with Dr. Kress' young life, fascination with nature, and ultimately, his draw to birds. It covers his beginnings as a young birder, and the positions he gleefully accepted to build up his resume and set the stage for his PhD work at Cornell, where he began working to reintroduce Atlantic Puffins to Eastern Egg Rock, Maine. The description of the emotional toll of reading about seabird communities devastated from the feather trade and hunting was poignant. Particularly striking was his singular focus on redressing the loss of puffins on islands in the Gulf of Maine, on which he had worked in summers past after reading about their demise. He describes acutely feeling the loss of puffins on those islands that were like his home, and chronicles how as a PhD student he set about his life's work of attempting to right that wrong.

The emotional roller coaster Dr. Kress embarked upon when trying to come up with brand new methods to restore seabirds is aptly described in the book. There are many details of the various correspondence, permit issues, logistical challenges, and hard work that went in to building the first restored seabird colony. The descriptions had us all on the edge of our seats, wondering whether Dr. Kress would get the permits approved, whether he and his team would be able to keep the puffin chicks alive, and whether they'd ultimately return to breed. The troubleshooting that is described underscores the incredible perseverance the team showed in bringing puffins back.

The later chapters of the book highlight the plight seabirds face today, with a whole chapter dedicated to the impacts of climate change. That chapter was particularly tough for my younger daughter, who hastily got up and turned a bunch of lights off in the middle of reading it. This illustrates that the connection Dr. Kress tried to draw between individual actions of people and the plight of seabirds was ultimately successful for our family. A compelling theme, especially in those later chapters, is encouraging people to act in whatever ways in which they're drawn to help conserve seabirds and natural resources more generally.

The discussion on 'conservation-reliant species'—those that require constant human intervention to thrive—provided us an opportunity to talk about the different ways people have impacted species like seabirds and how hard we now have to try to conserve them. The descriptions of predator control, and the numerous field assistants on Project Puffin that felt uncomfortable with them, led to a family conversation. Our consensus was that we don't like the idea of having to kill animals for the benefit of other animals, but in some cases it's necessary to do so. The nuanced discussion in the book helped us to have a similar one at home.

Two chapters entitled Seabird Super Heroes and Making a Difference highlight the hard work of a cadre of volunteers and assistants that helped to make the work at Eastern Egg Rock and other Project Puffin islands possible. It was refreshing to hear some of the stories that illustrated how a couple summers on a remote island can change career trajectories of aspiring biologists. The tales of how the methods pioneered at Eastern Egg Rock have been applied all over the world to restore and conserve many seabird species was equally inspiring. The epilogue, describing the experiences of three teenagers who came to Eastern Egg Rock as part of a summer program, was an especially fitting end to this book. Just as young Kress got his spark in nature as a young boy, these teens describe experiencing the up close and personal encounters with puffins on Eastern Egg Rock as exciting and potentially transformative. The descriptions of what they aspire to do with their lives were good reminders that their generation is acutely aware of the plight of our planet, and many are seeking to make a difference, just like Dr. Kress has.

Holly P. Jones, Department of Biological Sciences and Institute for the Study of the Environment, Sustainability, and Energy, Northern Illinois University, 155 Castle Drive, DeKalb, IL 60115, USA, hjones@niu.edu

Adalie A. Keltner, Batavia, IL, USA

Aliana K. Keltner, Batavia, IL, USA

THE FUTURE WE CHOOSE: SURVIVING THE CLIMATE CRISIS

FIGUERES, C. & T. RIVETT-CARNAC. 2020. Penguin Random House, New York. 242 pp. Hardcover: ISBN 978-1838770822, $23.00. Paperback: 978-0593080931, $16.00.

As scientists that study sentinels of the sea in some of the most sensitive ecosystems, we tend to be acutely aware of the ongoing environmental crises humans have caused across the globe. We witness the dire consequences of fossil fuel emissions changing the climate of the species we study, mourn their losses, and grow frustrated with the general inaction to meaningful change.

Christiana Figueres and Tom Rivett-Carnac, two of the diplomats and political lobbyists that were involved in the UN negotiations of the 2015 Paris Agreement, explored future scenarios as the climate crisis progresses. Their text, *The Future We Choose: Surviving the Climate Crisis*, opens with an overview of the climate crisis prior to COP26—the (in)action of global leaders, a collection of the climate change consequences experienced across the globe, and the palpable dissatisfaction represented at climate rallies. The authors then present a fork in the road for two different outcomes that we can choose—the future totality and devastation of our climate inaction and the future product of global cooperation and mitigation. In these thought experiments, the authors draw on real-world examples to build the worst- and best-case outcomes that can be chosen through our collective actions. They then present a road map of the ten items that can be undertaken on an individual level: let go of the old world, face your grief but hold a vision of the future, defend the truth, see yourself as a citizen and not as a consumer, move beyond fossil fuels, reforest the earth, invest in a clean economy, use technology responsibly, build gender equality, and engage in politics.

The Future We Choose is, in some ways, reminiscent of the visceral DDT catastrophe painted in Rachel Carson's *Silent Spring* that inspired a wave of environmental activism nearly 60 years ago. For a reader that is looking to take a brief sojourn into the climate crisis caused by anthropogenic carbon emissions for the first time, the authors do not hold back from the bleak future of unmitigated change. Yet, the book is not exclusively doom and gloom—nor should it be if we are to prevent a paralysis of hopelessness. There is a sprinkling of conservation successes and hopeful moments throughout. Perhaps most importantly, the authors attempt to empower the reader in finding ways in their own lives to address climate change.

While the book has a reasonable introduction to the dire straits of the ongoing climate crisis, the authors' core messages are unlikely to resonate with folks who are already entrenched in the topic. It's clear that the authors are attempting to stir readers to action, yet the text fails to acknowledge some important truths. Their ten recommendations in the second half of the book do not consider the differences in government, corporate, and individual behaviors, and the text misses how misalignment in stakeholder values ultimately translates to a gridlock of climate inaction. Moreover, the key messages are centered on individual consumer choices and do not acknowledge that corporations are directly responsible for > 70% of global carbon emissions (Griffin 2017). Just as the authors begin to broach the options to pressure corporations and governments into meaningful change, the text falls short with an offering of nebulous ideas in place of tangible actions (e.g., "assess the avenues" to political engagement when systems are undemocratic or unsafe).

The absence of top-down suggestions or plans is perplexing given that the authors' role in negotiating the 2015 Paris Agreement is what caused them to write this book. And as the recent UN Climate Change Conference in Glasgow shows, with governments failing to make meaningful progress on curtailing the root causes of climate change, there now is little reason to think international meetings of high-level diplomats will do anything to curtail the climate crisis. Also, at the time of this writing, the extreme response of some to COVID-19 mandates indicates the difficulty any top-down policies to address threats to society will have if they are seen as restricting individual behavior.

Although the text may be limited in presenting novel perspectives to scientists, there is value in a general awareness of the climate readings that are pitched to non-scientists. This book was an excellent opportunity to dispel common misunderstandings regarding the actions necessary to combat the climate crisis, such as planting trees vs. restoring ecosystem function through climate-resilient vegetation, and intensive agricultural grazing vs. reinstatement of grazing disturbances from large herbivores. But unlike *Silent Spring*, the authors of *The Future We Choose* did not delve into the scientific nuances. Perhaps as we build social connections with people in our local communities—a suggestion in the authors' action items—we can make opportunities to discuss science and pursue more transformative mitigation strategies.

Christy N. Wails, Department of Fish and Wildlife Conservation, Virginia Tech, Blacksburg, VA 24061, USA, wailscn@gmail.com

George Divoky, Cooper Island Arctic Research, Seattle, WA 98112, USA, divoky@cooperisland.org

Rachel T. Buxton, Department of Biology, Carleton University, Ottawa, ON K1S 5B6, Canada, Rachel.Buxton@carleton.ca

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