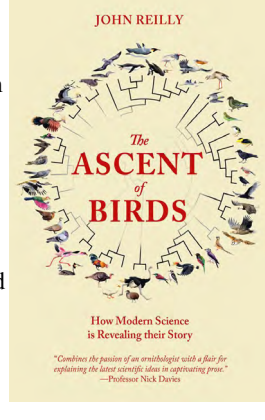
The Ascent of Birds: How Modern Science is Revealing Their Story

By John Reilly. 2018. Pelagic Publishing. 340 pages, 31.99 CAD, Cloth.



This book tells the fascinating story of the evolution of birds from their origins in Mesozoan Gondwanaland, which broke up between 130 and 50 million years ago, to their current worldwide distribution. I admit that when I first read the title, I thought this book would be about the dinosaur–bird transition and, while that is covered, it is a relatively minor story in the book. Reilly starts at the base of the avian phylogenetic tree, with the ratites, a diverse group of flightless birds that include ostriches and rheas, and proceeds chronologically towards the offshoots that gave rise to the finches and tanagers. Dr. Reilly is not a specialist in avian evolution (he had an illustrious career as a haematologist and blood cancer specialist) but combines his scientific training with a life-long interest in birds to present complex concepts and rapidly evolving research in a lively and accessible style.

The book is divided into two almost equal parts: non-passerines (13 chapters) and passerines (14 chapters). Each chapter is spearheaded by a named bird, from tinamous to tanagers, and begins with a look at the evolutionary history of the family or species of the

chapter title, followed by discussion of some of the specialized anatomical, physiological, and behavioural adaptations for those species. An example would be Chapter 5, "The Penguin's Story: Phenotype and Environment". While Reilly's basic question is "how did penguins evolve to survive the extreme polar environment?", he begins the story some 70 million years ago, in the Upper Cretaceous, when penguins split from other seabirds and then dispersed throughout the Southern Hemisphere. He then discusses their adaptations: changes in feather density and structure that aid in insulation in extreme temperatures; heat "exchangers" in feet and flippers; operation of their flippers by muscles located deep within their warm body and manipulated by long tendons; solid rather than air-filled bones that help deal with dive pressures; haemoglobin modifications to carry more oxygen; and social adaptations such as taking turns shuffling to the outside of the circle when incubating eggs.

Some of Reilly's "disarmingly simple" questions, such as why are there so many (well over a thousand) South American sub-oscines (the supposedly more primitive members of the passerines that have less well-developed vocal organs than the oscines), turn out to be unexpectedly complex, combining the effects of geographical isolation, geological upheavals, climate change, vicariance, and many unusual ecological niches. Many chapters include phylograms (family trees drawn by comparing gene sequences from different species) to show evolutionary relationships of bird families, which is the basis for most of the author's stories. Phylograms are really just scientific hypotheses waiting for more data to confirm or refute them, or for new analytical techniques to be developed. Because Reilly's career is not invested in the research, he even-handedly discusses conflicting hypotheses and interpretation of data in a number of instances. The advent of molecular genetics has enabled taxonomic relationships to be revealed, resulting in many recent changes among taxa. For example, Hepatic (*Piranga hepatica*) and Scarlet (*P. olivacea*) tanagers have traditionally been classified within the Thraupidae (Tanagers), but they are now known to be cardinals, while honeycreepers, seedeaters, conebills, saltators, Darwin's finches, and flowerpiercers are really tanagers … a good excuse to get a new field guide every year!

The occasional simple map shows the movement of continents or the dispersal routes of species. The 37 colour plates in the middle of the book, comprised of 51 images, complement the text. There is a tremendous volume of supplementary material, including a timeline, a chart of geological ages, a comprehensive glossary, 32 pages of chapter notes and citations (in reduced type), bibliography, list of species (376) mentioned in the text (in a nice touch that section is titled "Dramatis Personae"), and an index. The bibliography is rather short (three pages) because most of Reilly's sources are primary papers, of which there are no end of interesting ones to follow up on in the notes section.

While this book is a little daunting at first, covering as it does the entire evolutionary history of birds, the author does an excellent job of breaking the latest science down into understandable chunks, and I highly recommend it as an excellent synthesis of this amazing field of research. You won't look at birds the same again.

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