

## Cuckoo: Cheating by Nature

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BOOK REVIEW

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**Cuckoo: Cheating by Nature** by Nick Davies. 2015. Bloomsbury, New York. xx + 289 pages, 17 line drawings, 14 text figures, 21 color photographs. \$27 (hardcover). ISBN 978-1-62040-952-7.

After writing an award-winning account of the world's brood parasites (*Cuckoos, Cowbirds and Other Cheats*), naturalist and behavioral ecologist Nick Davies turns his storytelling talents to the “arms race” between the Common Cuckoo (*Cuculus canorus*) and the Reed Warbler (*Acrocephalus scirpaceus*), which he and his colleagues have studied at Wicken Fen in southern England for 30 years. In his latest book, *Cuckoo: Cheating by Nature*, Davies takes the reader “on a journey of discovery,” recounting the steps taken to unravel the evolution of the warbler's defenses against the cuckoo's trickery.

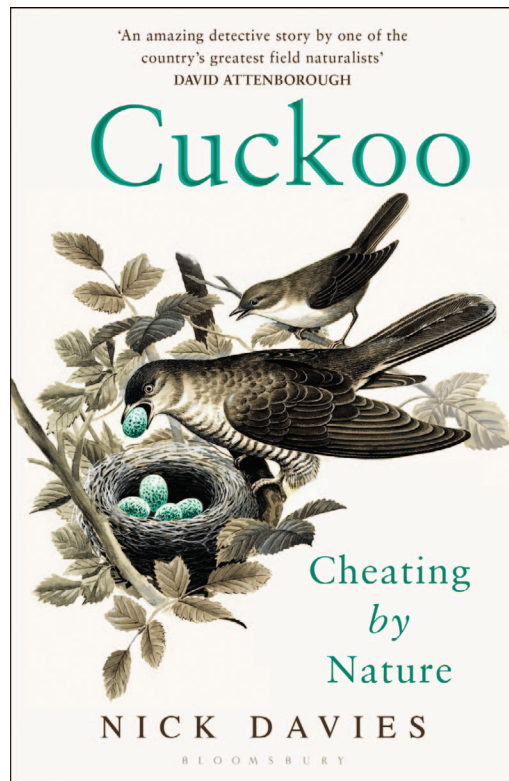
The book is divided into 14 chapters, each focused on an interaction between the cuckoo and the host. There are no references in the text, but each chapter is followed by sources that support the ideas and concepts discussed in the text or provide additional information. Although the focus is on the birds at Wicken Fen, Davies draws upon information from studies conducted in other parts of the cuckoo's vast range and on other parasitic species. Ever the naturalist, Davies also makes readers feel they are with him in the field by injecting observations from the world around him, such as the harriers coursing above the reed tops and cranes wheeling high overhead.

Underpinning much of Davies's work are observations of the early naturalists. The first chapter begins with Davies observing a warbler's nest, in awe of a young cuckoo being fed by unsuspecting hosts. This and other sights, Davies

acknowledges, have intrigued naturalists since Aristotle, and a succession of observations by literary figures and naturalists appeared over the ensuing centuries, until Charles Darwin dispelled the notion that the brood-parasitic mode of reproduction is anomalous; rather, it evolved gradually from parental ancestry. Darwin's intuition is now far from where Davies is working.

Less than a century ago, Edgar Chance uncovered “truths” as basic as how the cuckoo lays its egg and selects nests with eggs that closely match its own. Although these stories have been retold many times, they set up Davies's mission to determine why cuckoos behave in these and other ways. Armed with interesting questions, Davies was about to begin, but Wicken Fen had changed. Hundreds of years of deforestation and altered wetlands had fragmented the landscape to which cuckoos and warblers return in spring. Davies was initially reticent about initiating a study at a single site, but he was aware that Gilbert White's far-reaching contributions were made in and around his village of Selborne, over a period of 60 years. Davies's decision turned out to be a wise one. Pieces of the puzzle fell into place, supported by long-term data garnered from marked cuckoos and hosts.

Exchanges of eggs between nests, conducted by naturalists since the late 1700s, suggested that many hosts remove “foreign” eggs. Stephen Rothstein's detective work, which began in the 1960s, focused on another cheater, the Brown-headed Cowbird (*Molothrus ater*), and ushered in an era of controlled experimentation. Researchers recognized that they can play the role of the brood parasite. This was all the inspiration needed for a new band of researchers—Nick



Davies among them—who placed model eggs of various colors and markings into nests, some matching, some not matching the “host’s” eggs.

Results of experiments focused on how cuckoos beat host defenses are highlighted in Chapters 5 through 7: Eggs are less likely to be ejected if they resemble the size and appearance of the warbler’s eggs; laying in the afternoon, when the host is likely to be absent, lessens chances of ejection; speedy laying avoids detection at the nest; host-egg removal may ensure that the cuckoo egg is efficiently incubated and hatches on time; predators are not more likely to attack a clutch that contains a nonmimetic egg; and eggs that are both harder to detect and harder to remove evolve as host rejection increases. What emerged is a system of coevolution, with the “give and take” between cuckoos and hosts evolving together.

Egg mimicry isn’t the only type of mimicry in a cuckoo’s arsenal. Henry Bates’s early suggestion that protective mimicry fools predatory birds, and Alfred Wallace’s idea that this may account for the cuckoo’s hawk-like appearance, intrigued Davies. He wondered whether hosts were fooled by their similarity. Wicken Fen was an ideal place to try to find out because warblers see sparrowhawks and cuckoos there every day. As is sometimes the case, the results were not straightforward. Some Reed Warblers reluctantly approached a cuckoo mount placed next to nests, some retreated from the sight of it, and others attacked the cuckoo. Some pairs could tell the difference, but further tests revealed that variation in the amount of barring on the underparts of the cuckoo was important. No single cue was sufficient, but the cuckoo’s resemblance to a hawk tended to deter the host’s approach.

In Chapters 9 and 10, Davies could not resist repeating Edward Jenner’s famous observations of cuckoo chicks evicting host eggs, because they invoked the fundamental question of why hosts may recognize a cuckoo’s egg but not the young cuckoo. Research on other species of cuckoo suggests that the answer lies in the cost of imprinting and in the likelihood that a host will reject its own young in the future. Hosts still incur the cost of rearing the unrelated young, which makes them work as hard to feed a single cuckoo chick as to feed their own brood of four warblers. Nestlings of other parasitic species that are raised with the hosts are providing fruitful opportunities for comparative study.

The question of how cuckoos choose hosts and the challenges researchers face when testing hypotheses are addressed in Chapter 11. Gilbert White, who disdained the cuckoo’s habits, pondered this problem and, again, Jenner’s observations were insightful. The most common hosts are the smallest and most abundant, but many abundant species are not parasitized. Why not? Experiments

conducted at Wicken Fen and at other sites revealed different factors favoring one host over another: imprinting on one host, or on host songs; incompatibility of feeding or begging calls; nest structure (too deep, slippery sides); and mouth mimicry were important. As Davies notes, “[L]ife as a brood parasite is not easy.”

In the last two chapters, Davies worries about the decline in the cuckoo population and changes in migration. At the outset of the study, cuckoos had begun their dramatic decline at Wicken Fen and across England. Although this situation was not the one preferred, with the risk of parasitism reduced, a natural experiment played out over the decades of the study. Warblers reduced costly defenses used to combat parasitism, not through rapid genetic change, according to Davies and colleagues, but instead through the evolution of plasticity in defenses. Reed Warblers should be “ready” for cuckoos if their numbers recover, assuming that the cuckoos’ return in spring can be coordinated with the host’s nesting cycle and food supply.

The cause of the cuckoo’s decline is not known. Male cuckoos tagged in England undertook perilous journeys to overwinter in Africa, prompting Davies to echo the concerns of many that international cooperation is required to ensure availability of suitable habitats at all stages of birds’ lives, for the cuckoo and for other long-distance migrants.

Color photographs are augmented by lively pencil drawings prepared by James McCallum after he observed cuckoos at Wicken Fen for three months. The intensity of the cuckoo on the dust jacket is palpable, as it holds the warbler’s egg in its bill seconds before laying its own, watched uneasily by the host. Not shown is the cuckoo flying away with the egg in its bill, which many early naturalists saw as the cuckoo carrying its own egg to the host’s nest.

Davies’s recounting of his boyhood awakenings as a naturalist will prompt readers to recall their own early experiences with nature. Readers of *Cuckoo: Cheating by Nature* will think about the complexities of the brood-parasitic system and wonder what questions remain to be answered. There are many. Davies muses that “one could spend a lifetime, just sitting on this bank, and still always be discovering something new.” Those interested in good nature writing and in how field observations lead to well-conceived field experiments, followed by strong conclusions, should read this book. You’ll be glad you did.

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