More than MOCKing birds

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More than MOCKing birds: evolution of parental infanticide and siblicide

More than Kin and Less than Kind: the Evolution of Family Conflict by Douglas W. Mock. Harvard University Press, 2004. $27.95 (352 pages) ISBN 0674012852

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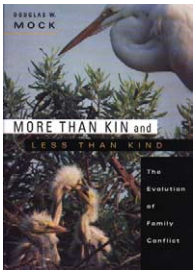

Many people like birds. They enjoy them for their marvelous power of flight, their melodious song and their cute little babies. However, those fond of birds might want to rethink their position in the light of what is really going on in a bird's nest: siblings pecking each other to death, slow starvation amidst abundant food supply, and seemingly sadistic parents that stand by and fail to intervene in the demise of their offspring.

Parental infanticide and siblicide are not topics that you hear or read about every day. In *More than Kin and Less than Kind*, Douglas Mock provides the details of family conflicts and, by blending natural history and theoretical biology, charts the various assumptions underlying the adaptive value of these behaviours. Before the mid-1960s, selection was widely believed to operate for the good of whole species or communities, so-called 'group selection'. Infanticide and siblicide were considered unusual behaviours and a means of removing the less favourable traits for the good of the species. However, this explanation became untenable when, during the 1960s, more cases of within-species cannibalism were described and evolutionists realized the importance of selection operating for the benefit of individuals (and their genes). Thus, a family member might profit directly by producing its own offspring, or, as in various social animals, indirectly by providing assistance to their parents in the rearing of younger siblings [1]. However, cooperation among siblings is not always evident, even within cooperatively breeding species, such as the laughing kookaburra of Australia. Kookaburras live cooperatively, with one monogamous breeding pair supported by older offspring that help feed their younger siblings. At hatching, young have temporarily hooked bills that they use to grasp the heads of their younger siblings, shaking them violently until they die.

Bullying and killing of chicks by the victim's kin is harsh and a bizarre phenomenon. Nevertheless, Mock shows that, in many species, parents often create more offspring than they normally will raise, and he tries to explain this phenomenon in light of the insurance hypothesis, which, although nearly four decades old, has until now had no firm broad acceptance. This hypothesis states that parents overproduce young to enhance their own reproductive success. For example, by overproducing, parents can capitalize on good food years when all offspring survive, with siblicide being an efficient mechanism to adjust brood sizes in poor years. When offspring compete for scarce resources, sibling rivalry kicks in, and siblicide is a mode by which young maximize their share of food resources. However, this does not explain the occurrence of obligate sib-killing, whereby the older chick(s) kill a younger nest mate regardless of the abundance of food. There is general consensus that obligate siblicide is an insurance mechanism to guard against the early death of a chick or to guard against egg infertility. Among others, obligate siblicide is practiced by most eagles, boobies, egrets, pelicans and some species of penguins, in which an infertile single egg might mean a completely wasted breeding season.

Mock touches on species other than birds, including plants on occasion, but the coverage is disproportionate, as he readily admits himself. Perhaps the subject will be more thoroughly explored for a wider range of plants and animals. The one area that I think is missing is a coherent discussion of the various strategies that marginal offspring use to overcome the handicap imposed by hatching last. For example, marginal chicks can channel resources into maintaining mass, relative to skeletal size, as a buffer against starvation. When food availability is good, marginal offspring devote more resources to skeletal growth and quickly close the gap on their core siblings; thus, the handicap is reversible [2]. Second, in colonially nesting birds that nest close to each other, last hatched chicks can avoid being harassed by their older siblings by climbing out of their nest to join younger offspring in other nests, where they become dominant chicks ([3,4] see also [5]). Breeding females can also create inequalities in growth rates of their offspring by producing the strongest sex in the late-hatched eggs [6], or by producing eggs that differ in the level of nutrients and hormones that stimulate growth and/or competitiveness of last hatched chicks [7].

More than Kin and Less than Kind is beautifully produced, instructive and exciting to read. Blending

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natural history and theoretical biology, Mock shows how Hamilton's rule illuminates the study of family strife. He has the skill to explain complex ideas to both a biological and a general audience. Through comparison across a wide range of bird species, it gives us a better understanding of when siblicide should be expected. It remains puzzling, however, that parental infanticide or siblicide has not evolved in other species whose young starve to death. This book is a must for everyone interested in animal behaviour and it encourages further field study of over-production in general, given that the process underlies much of the internal conflict observed in a wide range of mammals, insects and birds. I am sure that even bird lovers will not judge birds too harshly after reading this book.

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The hunter becomes the hunted

Antipredator Defenses in Birds and Mammals by Tim Caro. The University of Chicago Press, 2005. US$95.00/£66.50 hbk US$35.00/£27.00 pbk (592 pages) ISBN 0 226 09435 9/0 226 09436 7

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The taxonomic and geographical ubiquity of antipredator adaptations highlights the power of predation as a selective force. In *Antipredator Defenses in Birds and Mammals*, Caro reviews our knowledge and understanding of antipredator defence in these groups. As an entomologist who considers birds not as prey but as the archetypal predator, I wondered initially why the author had limited himself to species with feathers or fur. Well, this is a field that Caro has devoted much of his career to, and his comfort with the literature shows through. Furthermore, even when one keeps to homeotherms, it is clear that there is still plenty to talk about. Contemporary developments in this discipline have included the greater use of phylogenetically controlled comparative methods, but many more empirical findings have also been published since the last general reviews [1,2]. Field data, particularly of unstaged predation attempts on large animals, require considerable dedication to obtain, and Caro explores the implications of many such studies.

In *Antipredator Defenses*, Caro follows the format of a predatory sequence, beginning with avoiding detection, and moving through stages that include looking out for predators, warning predators and mobbing. Of course, no single species will engage in all of these separate stages of defence and the chapters can be fruitfully read in just about any order. Although homeotherms are uppermost, Caro occasionally turns to fish and reptiles to show how general certain phenomena can be, and frequently discusses theories originally motivated by studies of other taxa.

There is an impressive array of literature assembled here, which includes a healthy blend of the old and the new. For instance, I had forgotten that Cott had fed the flesh of dozens of species of birds to domestic cats *Felis catus* to test whether they were unpalatable, and I was unaware of the re-analysis [3]. Similarly, I enjoyed finding out about the recent work on the optimal time to emerge from a bolt-hole [4]. To me, however, one of the best things about *Antipredator Defenses* were the tables that collated papers on topics ranging from changes in nest defence during the breeding cycle, to the relationship between vigilance and group size in mammals. In particular, I have long admired Baker and Parker's classic paper [5] on the evolution of bird colouration, and it was enlightening to see a summary of the experimental data that are consistent and inconsistent with their provocative 'unprofitable prey' hypothesis.

Having recently co-authored my own book on antipredator defence [6], albeit with a more insect-orientated perspective, I have come to appreciate how hard it is to write a book of this kind, and I am therefore even more impressed by Caro's accomplishment. I also began wondering about the differences in antipredator defence between birds, mammals and insects. There is little doubt that insects show a greater range of antipredator adaptations, probably because they are inherently diverse, but also perhaps because their small size renders them vulnerable to a greater range of predators. There are

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