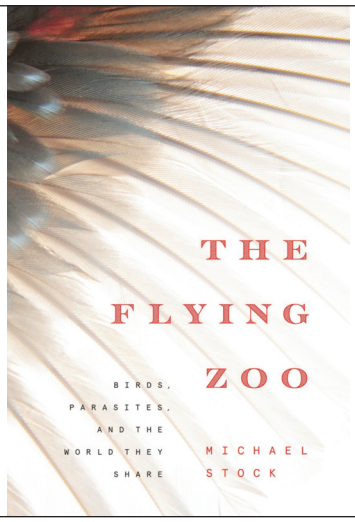
Book Reviews

Source: Ardea, 108(2) : 223-227

Published By: Netherlands Ornithologists' Union

URL: https://doi.org/10.5253/arde.v108i2.a12

Stock M. 2019. The Flying Zoo. Birds, parasites, and the world they share. Edmonton, Alberta. Paperback, 260 pp., 50 b/w photos and b/w illustrations, tables. ISBN 9781772123746. €28.50.



Antarctic fleas that survive freezing temperatures for nine months before jumping onto cliff-nesting fulmars. Penguin ticks that survive being submerged for more than 200 days. Feather mites that make precise decisions to escape from feathers to be moulted. Owls that capture and transport live blind snakes to their nests to feed on nest-dwelling parasites, so that their owlets can grow faster. Waterbirds that actually prefer to eat worm-infected easy prey. These are just some examples of the co-evolutionary dance of birds and their parasites you can find in Michael Stock's book, 'The Flying Zoo: Birds, parasites, and the world they share'. But Stock, a parasitologist and professor at MacEwan University, goes well beyond bizarre and amazing natural history finds and explores complex and often contradictory notions of host–parasite co-evolution.

This is a wonderful book you could possibly read in one go– easy to read, hold, carry or put on a shelf. It is well illustrated with photos, illustrations and tables. The reference list is long and appears fairly comprehensive and will form a useful jumping off point for those who want to delve even deeper. Not surprisingly 'The Flying Zoo' has been regarded as the contemporary follow-up to the classic 'Fleas, Flukes & Cuckoos' by Miriam Rothschild and Theresa Clay (Rothschild & Clay 1952) – the first book devoted entirely to the various groups of parasites which live in or on birds. This is a fair comparison to make, since they both offer a gentle introduction to the fascinating world of avian parasites and are divided into chapters that essentially correspond to major parasite groups (lice, flies, ticks, mites, flies, worms, etc.). Stock's work neatly bridges the generation gap with current topics in parasitology, including chemical and pathogen pollution, or parasite conservation; and he does so with insightful ecological context!

Throughout the book the author acknowledges that the parasite-bird relationship is far from simple, and that often the effects of parasites on their hosts results from the interplay of several factors. At the same time, he builds bridges between parasitologists, who have sometimes been accused of overstating the effects of parasites on every aspect of birds' lives, and ornithologists, ecologists and naturalists who have often tended to think that parasites are not important. As Stock himself notes, "the truth lies somewhere in between the two extremes – parasites may be influencing anything from the brilliance and complexity of birds… but they are only a part of the overall picture." Surely this is something to applaud.

It is an enjoyable read, chapter by chapter. In the first chapter, headed 'A world on a bird', Stock illustrates in a delightful manner the intimate relationships which exists between birds and their parasites. He explains the idea that birds are ecosystems, or 'zoological gardens', where parasites have evolved to survive. Indeed, different habitats of these ecosystems, such as feathers, can provide information about the contents of a bird's zoo. For example, 'body lice' typically have stubby bodies and try to escape preening by hunkering down into the downy parts of feathers, whereas 'wing lice' have long bodies and try to escape preening by wedging themselves into the spaces between feather barbs. The colour of the feathers influences the colour of lice too, as colour matching helps them hide from a bird's sight as it preens. Other parasites have become specialized for life in other microhabitats where eviction is difficult, like the mouth and gular pouches of pelicans or the quills of a curlew's wing feathers.

The second chapter, 'Lice: It's a beautiful life', goes on to describe the intimate connection between feather lice and their hosts, showing good evidence of co-evolution and co-speciation. It reminds us that feather lice have provided reliable evidence about the evolution of seabirds, ostriches, rheas and emus. Stock here presents major 'rules' of co-evolution that describe

some elegant patterns. Among them, that parasite evolutionary histories should mirror the histories of their hosts (Fahrenholz's rule), or that large-bodied species of hosts should have large-bodied parasites (Harrison's rule). The author cautions the reader that "the rules of co-evolution are subject to exceptions that typically point to more nuanced explanations […] and ecological factors need to be considered". Stock goes beyond a summary of known information and outlines the future direction of research.

The following chapters on fleas, ticks, mites, flies and worms and other oddities in the flying zoo are equally lucid and informative (chapters 3 to 8). All these parasites tell us tales about how birds live and what birds do. Often one can't tell whether a certain parasite is a friend or foe. This is particularly true for feather mites. These tiny arachnids may function as parasites that can weaken their hosts, as commensals that associate with birds but don't seem to seriously affect them, or even as mutualists that provide some benefit to birds. Hence, many scientists refer to them as symbionts (Walter and Proctor 2013). Other common parasites in hosts can actually reduce opportunities for more pathogenic ones. Furthermore, parasitized intermediate hosts can be important in feeding ecology – the caloric benefits of easy prey frequently outweigh the energetic cost of eating them.

Yet the parasite-bird relationship is far from benign. Parasites exert strong selection pressures on birds, influencing their behaviour. Stock summarizes beautiful examples of anti-parasite behaviours (see also Bush & Clayton 2018 for a recent review). And then there is the whole question of sexual selection (discussed in chapter 9). This book tells you a lot about the details behind how pathogenic parasites shape sexually selected traits – the Hamilton-Zuk hypothesis that desirable traits signal good genes for health and parasite resistance (Hamilton & Zuk 1982). Colourful or showy displays, complex songs and other external signs can be influenced by parasites. But what if the parasites are not harmful or are even beneficial? Stock explores the controversial and interesting question of sexual selection for 'good' parasites: "A bird might look for a mate with brighter plumage, not because bright plumage signals a lack of parasites, but because these birds likely have more of the helpful feather mites than birds with duller, dirtier feathers." If so, the desirable trait is still conveying information about the birds' health. The author always presents both sides of the debate, and a list of unsolved problems and interesting open questions for future research.

Times are gonna change, for better or worse. In the last chapter, Stock points out how human-caused environmental change (climate change, animal range expansions, migration route changes and species introductions) can impact the future of the flying zoo, and thus disease and epidemics. Ecosystem loss will result in more and new diseases like West Nile and Lyme. Birds and humans are going to be exposed to microorganisms with which they are unfamiliar. Because of contacts between birds and other animals, the possibility exists for additional interspecies transmissions and resulting disease outbreaks. Sadly, we all know that an outbreak of an epizootic disease could kill thousands of people.

But there is reason to hope. Stock ends with a list of simple things (summarized in table 10.1) all of us can do to stop and even reverse the dreadful trends that we are now seeing. As he concludes, "if we take responsibility as caretakers of our planet, we can still save the flying zoo, the Earth, and ourselves."

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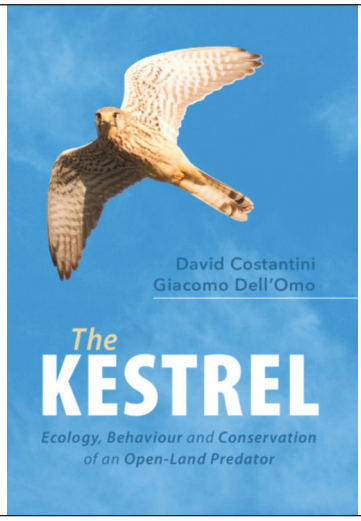
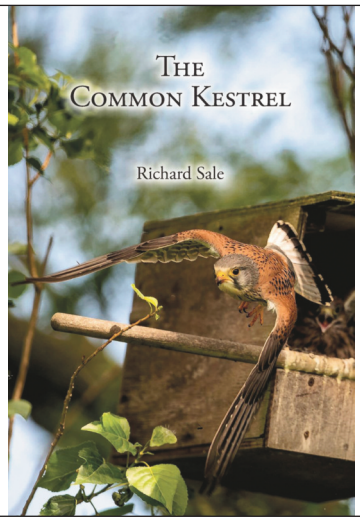
Jorge S. Gutiérrez, University of Extremadura, jorgesgutierrez@unex.es

Constantini D. & Dell'Omo G. 2020. The Kestrel: ecology, behaviour and conservation of an open-land predator. Cambridge University Press, Cambridge. Hardback, X + 214 pp. ISBN 978-1-108-47062-9. €61.99.



Sale R. 2020. The Common Kestrel. Snowfinch Publishing, Coberley. Hardback with dust wrapper, 392 pp. ISBN 978-0-9571732-4-8. £58.99.



The Kestrel *Falco tinnunculus*, or should I say: the person interested in Kestrels, has been served in the past with a wealth of monographs, ranging from personal accounts to thorough reviews of scientific literature. Andrew Village's 'The Kestrel' stands out as the ultimate attempt to cover the ecology of a common raptor. It was published in 1990, and three years later followed by shorter monographs covering the same ground ('The Kestrel' by Michael Shrubb) and with a more continental emphasis because of inclusion of the extensive German literature ('Der Turmfalke' by Renate & Achim Kostrzewa). And now, all of a sudden, another Kestrel spike in book form. In the intervening period Kestrels have been the subject of intensive research, not least because it is a raptor species relatively easy to manipulate (in the field as well as in the lab), a trait that biologists have exploited in their search for ecological principles. On the other side of the pond biologists have found a similar plaything in the form of the American Kestrel *Falco sparverius*.

It is interesting to see what great strides have been made since the early 1990s. Several research groups focused on various aspects of ecology with the Kestrel as a model species, e.g. by the late Serge Daan of the University of Groningen (energetics, circadian systems), Erkki Korpimäki of the University of Turku (predator-prey interactions, vole cycles) and David Costantini of the Muséum Nationale d'Histoire Naturelle (physiology, immunology). The resulting specialized papers are not always easy to digest or to put into perspective. The fact that scientists take the trouble to enlighten lay people, as exemplified by the underlying monographs, is fantastic.

Although the two books show substantial overlap in the subjects covered, each has its own hobbyhorse and style. The extent to which particular subjects are dealt with also varies accordingly. Costantini and Dell'Omo, for example, also address Kestrels from within, where antioxidants, hormones, parasites and pathogens control physiological and immunological functions; in fact, they can either smooth the path, or play havoc, in individual life histories. From the age of a few days old, oxidative stress impacts growth and development, with far-reaching consequences for later life. The physiology of Kestrels is exposed to chemical (and possibly also non-chemical, such as light, noise and electromagnetic fields) pollutants, which biomagnify across the food chain and cause all kinds of problems in behaviour and reproduction. Much of this research is lab-based, and it is very difficult to predict effects in the field under natural conditions. Such provisos can be found throughout the text, relating to a wide range of subjects: we

know an awful lot, but still more is a mystery or applicable in a restricted sense only (time, place, lab/field). But not to despair: 'The Kestrel' is concise, to the point and outfitted with summaries in which gaps in science are outlined. Utterly infectious, both for the professional and the amateur.

'The Common Kestrel' by Sale covers, as said, much the same ground, using the same science. On the other hand, it is quite different and as such a nice complement to 'The Kestrel'. For example, the breeding cycle is described in great detail (by L. and S. Newbury and N. and R. Sale), using new data derived from video-recording for four consecutive years (2017–2020) at a nest box in a barn in southern England. Courtship, egg laying, incubation, hatching date and parental care were followed minute by minute and are condensed into graphs and figures showing diurnal and seasonal patterns. Prey and prey delivery rates were measured throughout the breeding cycle and correlated with rainfall and wind speed. Simultaneous live-trapping showed that mice might be the more abundant prey species but voles were the main catch by Kestrels. Video-recording proved that small mammals comprised almost 90% of all prey, the rest almost exclusively birds (mainly captured by male Kestrels); such findings prove once again that dietary studies based only on remains in pellets should be treated with caution. Extracting information from non-stop filming or time-lapse photography at nests is clearly a fertile way to go (as shown for Dutch Kestrels by Wassink 2007, 2008). Still more can be learned from closely tracking incubation behaviour, for example egg turning frequency relative to composition of the eggs and diurnal cycle, very well researched in poultry but not in wild birds (and among Falconidae, only in Peregrine Falcons *Falco peregrinus*; Deeming 2002). Another topic elaborated in Sale's book is flight and hunting behaviour, not least because of the author's interest in flight mechanics (as his use of trained Kestrels testifies) and the availability of extensive literature based on experiments with Kestrels in wind tunnels and in the field by John Videler and Dirkjan Masman. These chapters contain much new material, illustrated with a plethora of full-colour photographs.

The two monographs have their own merits and the Kestrel aficionado buying both will not be disappointed. The more scientifically inclined student, searching for new ground to cover, may be best served with Costantini & Dell'Omo. 'The Kestrel' is the more scholarly one, written in the style typical of scientific journals and with tens of graphs, few photographs (including a quire with coloured pictures), an extensive list of references, an index and, very handy, summaries at the chapters' end. The science used for this book is gleaned from the Anglo-Saxon literature, ignoring the world of amateurs and the massive continental literature published in other languages than English. 'The Common Kestrel' is less concise, but instead opts for a more descriptive style of writing (mind you, without corrupting the science), with elaborations where personal observations are introduced or conflicting science is available (for example, Kestrels using UV-light to track voles, which is a myth), an extensive reference list and index. Insofar that amateur sources are tapped, these are largely confined to the UK; the mountain of non-English literature remains, with a few exceptions, unused. 'The Common Kestrel' is abundantly illustrated with hundreds of photographs (showing not your average portraits, but instead specific behaviours and settings) and more than a hundred graphs.

Deeming D.C. 2002. Patterns and significance of egg turning. In: Deeming D.C. (ed.) Avian incubation: behaviour, environment, and evolution. Oxford University Press, Oxford, pp. 161–178.

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Village A. 1990. The Kestrel. T & A D Poyser, London.

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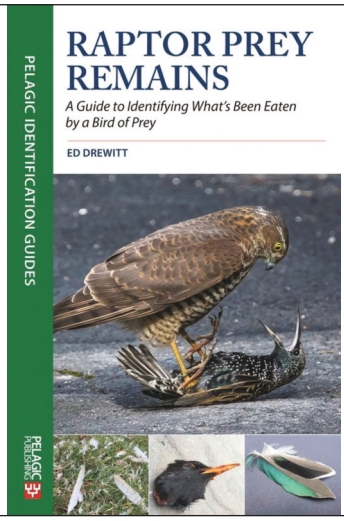
Wassink G. 2008. Webcamobservaties bij het nest van een Torenvalk *Falco tinnunculus* in 2008. Takkeling 16: 225–233.

Rob G. Bijlsma, Doldersummerweg 1, 7983 LD Wapse, The Netherlands, rob.bijlsma@planet.nl

Drewitt E. 2020. Raptor prey remains: A guide to identifying what's been eaten by a bird of prey. Pelagic Publishing, Exeter. Paperback, X + 230 pp. ISBN 978-1-78427-207-4. €33.99.



A labour of love, no doubt about it, this photographic guide to the food remains of birds of prey. The author's background in food studies is formed by his work on Peregrine Falcons *Falco peregrinus*, a species with the fortunate habit of using larders and a rough and tumble way of plucking prey (wings still attached to collarbones, stripped carcasses or legs and heads on and beneath plucking posts). This setting shows in the present book. Raptorphiles steeped in diets of Accipiters, Buzzards or Hobbies can just dream about such an abundance of evidence. The present guide is essentially a species by species account (some 95 species or species groups, mostly common ones), illustrated with full-colour pictures of prey remains and field settings. The remains include carcasses, eaten or partly eaten, heads, skulls, legs, loose feathers or complete wings and tails. In fact, it is the mishmash encountered while collecting prey remains in the field. The presentation does not attempt to produce a standardized plumarium (a neat display of all flight feathers, sometimes with selected coverts and body feathers, in which the German feather lovers excel). The field background is the real asset of the book, because real life in raptor-land is dirty and incomplete, meaning that plucks rarely provide all flight feathers, or legs, head, fur or otherwise diagnostic material that may help in prey identification. The quality of the photographs varies a lot, from high quality to blurry, from large size to postage stamp format. And although captioned, the information provided per photograph is rarely helpful beyond naming as primary, tail feather or some such. What, for example, makes a pigeon primary a Woodpigeon *Columba palumbus* primary, or what makes the difference between wing feathers of Feral Pigeon *Columba livia* and Stock Dove *C. oenas*? Differentiation between adult, juvenile and recently fledged birds is hardly ever provided, and if so, without explanation. The species texts are very short, and of limited help with identification. That is also true for the introductory chapters, where useful hints are interspersed with wrong, doubtful or incomplete information. Goshawk *Accipiter gentilis* nests are not littered with prey remains, except when it is used as a plucking post by fledglings. Similarly, plucked feathers beneath Sparrowhawk *Accipiter nisus* nests are typical of successful nests with branchers or fledglings, not of nests in earlier stages of the breeding cycle. And why feathers on Buzzard *Buteo buteo* nests are thought to represent scavenged road kills eludes me.

For a raptorphile active on the continent, it was a bit of a surprise to see that the vast – and vastly superior – continental literature on feather identification was not even mentioned, just a few English sources and in-hand guides. Especially in Germany/Austria, the science of feather identification is light years ahead of whatever else is available, starting in the early 1900s (Rörig, Uttendörfer) and improving all the time through to the present (e.g. Bergmann 2015, Hansen & Synnatzschke 2015). Even heavier tomes are planned for the near future, for example the concise edition of 'Atlas of feathers of Western Palearctic birds' (two volumes, by Gabriel Hartmann, although recent information on publication date is vague). These books give extensive background information on how and why to collect feathers. The same applies to websites, of which now several handfuls are operational, some of which show superb collections, with superb information on sexing, ageing, intraspecific variation, differences with closely allied species, measurements and photographs (e.g. www.vogelfedern.de, www.alula.fr, www.michelklemann.nl/verensite, www.blascozumeta.com). Still, the avid raptorphile will surely find useful information in Drewitt's book and would want to keep his library complete.

Bergmann H.-H. 2015. Die Federn der Vögel Mitteleuropas: eine Handbuch zur Bestimmung der wichtigsten Arten. AULA-Verlag, Wiebelsheim.

Hansen W. & Synnatzschke J. 2015. Die Steurfedern der Vögel Mitteleropas. Verlagsgruppe Federfuehrer Publishers, Gütersloh & Leipzig.

Rob G. Bijlsma, Doldersummerweg 1, 7983 LD Wapse, The Netherlands, rob.bijlsma@planet.nl