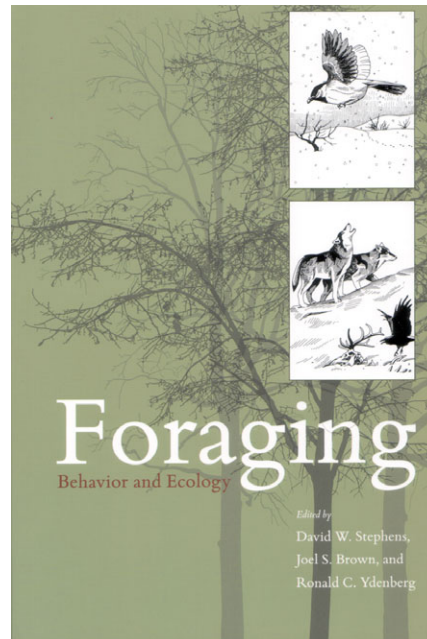## FORAGING: THE BROAD PERSPECTIVE

Foraging: Behavior and Ecology

Edited by David W. Stephens, Joel S. Brown and Ronald C. Ydenberg

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You might be forgiven for thinking that everything had been said about foraging theory. It is, after all, almost 30 years since 'Behavioural Ecology', that seminal work by Krebs and Davis, was published. However, this is not so. Not just because all animals have to forage, and there are possibly as many different types of foraging as there are animals, but also because the various iterations of this work, such as 'Foraging Theory' by Stephens and (the same) Krebs have been updating the scene along the way. The latest offering, 'Foraging: Behavior and Ecology', edited by David Stephens, Joel Brown and Ron Ydenberg, is a 608 page, 14 chapter, new look at foraging from a truly broad perspective. Importantly, this book is certainly no simple update, although it does repeatedly compare itself to Stephens and Krebs. It casts the widest net around foraging ever, seemingly leaving no stone unturned and bringing in examples that range from insects to humans.

In fact, from the very beginning, it is clear that this book is different. The prologue begins 'Hudson Bay in winter is frozen and forbidding ... with vigorous wing strokes ... (eider) descend to the bottom, where they search through the jumbled debris, finding and swallowing small items, and occasionally bringing a large item, such as an urchin or a mussel clump to the surface'. This is a much welcomed touch of the artist in what might otherwise be a dry scientific trundle round important behavioural and ecological principles. Happily, this approach is repeated at the outset of almost all the chapters of this book. The scenarios used range from graphic imagery of heavy bumblebees plunging their heads into bowing flower corollas (in the chapter that looks at the neuroethology of foraging, covering elements such as the 'mushroom bodies' in bee brains, and how memories might work) to wolves hunting down moose on a 'bone-chilling winter night' (in the chapter on the games played by social foragers, which includes examining group size, information sharing and scrounging). Such writing shows how hard the contributors worked to link conventional theory to real animals in the real world, miles away from cages and experimental set-ups. This approach must appeal to a broader readership and capture the imagination of marginal readers. It is not that this book doesn't refer to laboratory-type work either, it's just that it doesn't attempt to disguise the complexity of animals and the consequent plethora of considerations that are relevant for researchers working in this field by singular experiments where the constraints are so tight that any attempt at realism seems lost.

The overall layout of the book is split into four parts, which tend to lead from animal 'internal' workings (such as state-dependent elements, neurology and cognition) to consideration of 'external' workings (where sociality, populations and community ecology are examined). After chapter 1, which is an illuminating overview by the editors, part 1 covers 'Foraging and Information Processing' and the three chapters deal with 'Models of Information Use', the 'Neutroethology of Foraging' and 'Cognition'. Part 2 is concerned with 'Processing, Herbivory and Storage' and the three chapters examine 'Food Acquisition, Processing and Digestion', 'Herbivory' and 'Energy Storage and Expenditure'. Part 3 is labelled 'Modern Foraging Theory' and its three chapters deal with 'Provisioning', 'Foraging in the Face of Danger' and 'Foraging with Others' while part 4 is simply entitled 'Foraging Ecology' and has four chapters that look at 'Foraging and Population Dynamics', 'Community Ecology', 'Foraging and the Ecology of Fear' and 'On Foraging Theory, and the Conservation of Diversity'. Dry mathematics occurs in almost all chapters of the book, something that is almost inevitable when there are attempts to couch

animal foraging in terms of rules, but the editors have been wily, and often present these as separate 'boxes' interspersed within the main body of the text that can be ignored by those unwilling, or unable, to get to grips with matrices or differential equations. Annoyingly, in my copy there was an extra page of errata supplied with the book to cope with multiple problems with equations in the chapter by David Stephens on 'Models of Information Use' and I managed to find another misprint in the chapter on 'Food Acquisition, Processing, and Digestion' by Christopher Whelan and Kenneth Schmidt where an unfortunate π managed to creep in where it shouldn't. This is exceptional though, and the general standard is excellent, with a multitude of simple graphs and the odd line drawing of an animal to help the reader through the issues.

After reading the whole of this book I came away with two overriding and contrary feelings. Firstly, that the editors and authors have done a superlative job in covering an incredible diversity of issues relevant to foraging while keeping the reader on the ball with snippets of fascinating information (I didn't know, for example, that sheep prefer to eat clover in the morning and grass in the afternoon) thus making this publication now essential for anyone who wants to be brought up to speed. They have certainly set the bar high for those attempting to follow. Secondly, and importantly, it made the complexity of the issues of optimal foraging so apparent that it left me wondering if we were ever going to be able to really deal with the situation in the wild. If, as a person aspiring to try and understand the foraging decisions of free-living animals, this book doesn't send you screaming from the room contemplating doing watercolours instead, nothing will!

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