Even the casual observer of nature soon realizes that there are palpable differences in the breadth and diversity of resources used by species, even quite closely related ones. Species also show disparate propensities to occupy habitat types, some restricted to a very few, while others are to be found in almost any habitat within their geographic ranges. The variation in the breadth of resource use (ecological versatility) and in habitat use (ubiquity) has important implications for understanding ecological diversity. This book is the first to draw back from particular disciplinary foci, such as host-plant use in phytophagous insects, bilateral mutualisms or competitive coevolution, to develop a broader perspective of versatility and ubiquity. This is done by addressing three main questions (1) how do ecologists study versatility and ubiquity, and what do we know from these studies? (2) how well does existing theory account for observations, and what are the common threads between disciplines? and (3) what is the relationship between versatility and ubiquity? The analyses are undertaken from an ecological rather than evolutionary perspective. The outcomes of the review indicate some promise of unification and systematicization. However, there are exceedingly demanding challenges that ecologists must face in their quest for a more thorough understanding of ecological versatility.

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CAMBRIDGE
UNIVERSITY PRESS

CAMBRIDGE UNIVERSITY PRESS
Cambridge, New York, Melbourne, Madrid, Cape Town,
Singapore, São Paulo, Delhi, Tokyo, Mexico City

Cambridge University Press
The Edinburgh Building, Cambridge CB2 8RU, UK

Published in the United States of America by
Cambridge University Press, New York

www.cambridge.org
Information on this title: www.cambridge.org/9780521405539

First published 1995

A catalogue record for this publication is available from the British Library

Library of Congress Cataloguing in Publication data
MacNally, Ralph C.
Ecological versatility and community ecology / Ralph C. MacNally.
p. cm. – (Cambridge studies in ecology)
Includes bibliographical references (p.) and index.
ISBN 0 521 40553 X (hardback)
1. Ecology 2. Biotic communities. 3. Habitat (Ecology)
I. Title. II. Series. QH541.M225 1995 574.5–dc20 94-41872 CIP

ISBN 978-0-521-40553-9 Hardback
ISBN 978-0-521-11926-9 Paperback

Cambridge University Press
978-0-521-40553-9 - Ecological Versatility and Community Ecology
Ralph C. Mac Nally
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978-0-521-40553-9 - Ecological Versatility and Community Ecology
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Preface

When Professor John Birks kindly offered me the opportunity to submit an outline for a book for the *Cambridge Studies in Ecology* series, I decided that it would be worthwhile to analyze comprehensively ecological specialization and generalization in natural communities (commonly referred to as *niche breadth*, or *niche width*). Of course, there has been no shortage of review articles on particular groups of organisms, especially insects, looking at this question (e.g., Fox and Morrow 1981, Schemske 1983, Berenbaum 1990, Jaenike 1990, Andow 1991). Nor has there been any lack of theoretical attention (e.g., MacArthur and Levins 1967, Van Valen and Grant 1970, Roughgarden 1972, Slatkin and Lande 1976, Keast 1977, Siegismund *et al.* 1990). Futuyma and Moreno (1988) provided an excellent short review of this topic from an evolutionary perspective. However, it seems that a more extensive treatment of reasons for specialized or generalized resource use and its relationship to community dynamics would be an appropriate subject for a book in this series. I did not realize at the time that this seemingly well circumscribed topic would so thoroughly ramify throughout community ecology. However, a retrospective reading of Futuyma and Moreno's (1988) article had (correctly) said as much in the very first paragraph.

An important dichotomy is developed in Chapters 1 and 2 based on specialization–generalization at the local scale, and the capacity of species to occupy few or many different types of habitats. Fox and Morrow (1981) drew attention to the difference between the degree of specialization or generalization at the scale of the local population, and the degree when integrated over the entire range of a species (i.e., all populations of a species). They noted that some species could be 'local' specialists, relying on one species of host plant, for example, in one type of habitat, yet switch hosts in different habitats. Thus, while maintaining a similar degree of specialization of local resource use, the species might still be perceived as a generalized one over the variety of habitats it occupies. Cody (1974) was another who recognized that niche width might be partitioned into local and global components. He believed that some species of food specialists (e.g., parulid warblers) occupy many types of habitats, while species restricted in habitat use often were food generalists (e.g., emberizid finches). This distinction between local and global specialization and generalization is a crucial one, and dictates the content of this book. Almost all of this volume is concerned with specialization and generalization at the local scale. I ask questions like: how is it framed? how is it studied? what do we know? which ecological processes affect it? and how can we model it? Specialization and generalization in the use of habitats are considered more briefly, being the main focus of Chapter 8. But, generally speaking, the book addresses local specialization and generalization.

Many people have contributed in one way or another to getting this book written, but four were particularly helpful and generous with their time and conceptual and editorial criticisms. My wife, Dr Jane Doolan, deftly wielded her editorial pencil on parts of the manuscript. The project happened to coincide with the arrival of our children, Erica and Aleck, so that Jane also bore the brunt of attending to their (ongoing) constant demands and wishes during this period. For these Herculean tasks, I thank her very fondly.

The main conceptual reviewers of the manuscript (apart from the *Studies* editors) were Dr Peter Fairweather, formerly of Macquarie University but now with the CSIRO, and Dr P. S. 'Sam' Lake, of Monash University. I was indeed fortunate to be able to call upon two such fine and versatile scholars and ecologists for their advice and comments. Their marine littoral and limnological backgrounds helped, no doubt, to broaden the subject-matter from my exclusive experience in temperate, terrestrial systems.

The fourth substantial contributor was Dr Craig Blundell, formerly of BHP Research in Melbourne. Although he is a geophysicist, his broad interests in science and philosophy spurred me on continually. I like to think that I contributed modestly to his doctoral studies spanning the same period in which this book was written. His mathematical acumen and knowledge were a great boon during the development of the modelling algorithms discussed in Chapters 6 and 7 and Appendix B. We shared many tortuous paths before reaching the eventual solutions.

I am also grateful for comments on some chapters by Professor Peter Petraitis of the University of Pennsylvania (Chapters 2 and 3) and Dr Barbara Downes of Melbourne University (Chapters 1 to 4), both of whom prompted important clarifications or additions. I should add the usual caveat that all of the opinions in the book ultimately are my responsibility and that none should necessarily reflect on the scientific credibility of any other persons named here.

I also thank Gerry Quinn, Barry Traill, Linc McIntosh, Niall Richardson, Dugal Wallace, Angela Bowles, Tim Monks, Ian Hoyle and 'both' of my families for their assistance or encouragement. The support of Professor J. W. Warren and the Department of Ecology and Evolutionary Biology at Monash University was invaluable. I also thank the Australian Research Council for some support during the latter phases of writing.

And last, but hardly least, I thank the editorial and production staff of Cambridge University Press. Professor Birks provided critical and editorial advice for which I am most grateful; I hope he is pleased with the outcome. I am especially indebted to Professor John Wiens, whose criticisms, suggestions and thoughtful comments on the manuscript were priceless. He kindly devoted time to the task when he was on sabbatical leave at the University of British Columbia, which clearly indicates a high degree of altruism on his part. I also wish to acknowledge Dr Alan Crowden for maintaining a subtle correspondence of coercion across the world.

RCM
August 1994, Melbourne