

Contents

Preface	ix
List of Tables	xi
List of Figures	xiii
1. Introduction	3
2. A Relation between Food Webs and Niche Space	6
2.1 Interval Graphs and the Dimensionality of Niche Space	6
2.2 Food Webs Defined by Community, by Sources, and by Sinks	20
2.3 Food Webs of Single Habitats and of Composite Communities	23
2.4 Competition and Niche Overlap	24
2.5 Summary	26
3. Which Food Webs Are Interval?	28
3.1 Sources of Data	28
3.2 Review of Food Webs	31
3.3 Summary	40
4. Statistics of Food Webs	41
4.1 Why Statistics of Food Webs?	41
4.2 The Food Web Matrix	44
4.2.1 Are Predators and Prey Fussy?	44
4.2.2 The Ratio of Prey to Predators	51
4.2.3 The Length of Food Chains	56
4.3 The Niche Overlap Matrix	58
4.3.1 Six Models Based on the Food Web	58
4.3.2 The Distribution of Niche Overlaps	71
4.4 Summary	73

CONTENTS

5. Frequencies of Interval Food Webs in Observed and Monte Carlo Samples	75
5.1 Matching Food Web Characteristics	75
5.2 Matching Niche Overlap	81
5.3 Calibrating the Lottery	86
5.4 Summary	92
6. If Niche Space Is One-Dimensional	93
6.1 What Is the One Dimension?	93
6.1.1 Non-Uniqueness	93
6.1.2 Suggestions from the Food Web Studies	95
6.1.3 Suggestions from Other Studies	97
6.2 What Follows from One Dimension?	100
6.3 Why One Dimension?	104
6.4 Summary	109
7. Extensions and Critique	111
7.1 Extensions of This Approach	111
7.1.1 Higher Dimensions	111
7.1.2 Nearly Interval Food Webs	115
7.2 Critique	118
7.2.1 Ambiguous Primitives	118
7.2.2 Statistical Shortcomings of the Data	120
7.2.3 Lack of Quantitative Content	122
7.2.4 Lack of Dynamic Theory	124
7.3 Summary	125
8. Review of Open Problems	126
8.1 Introduction	126
8.2 Theoretical	126
8.3 Empirical	129
Appendix 1: Sample of Food Webs	133
Appendix 2 by Thomas Mueller and Joel E. Cohen: The Mean and Variance of Niche Overlap according to Six Food Web Models	166

CONTENTS

Appendix 3: Expected Niche Overlaps Assuming Randomly Overlapping One-Dimensional Niches	173
References and Author Index	174
Index	185