

UNDERSTANDING AND PREDICTING SPECIES diversity in ecological communities is one of the great challenges in community ecology. Popular recent theory contends that the traits of species are "neutral" or unimportant to coexistence, yet abundant experimental evidence suggests that multiple species are able to coexist on the same limiting resource precisely because they differ in key traits, such as body size, diet, and resource demand. This book presents a new theory of coexistence that incorporates two important aspects of biodiversity in nature—scale and spatial variation in the supply of limiting resources.

Introducing an innovative model that uses fractal geometry to describe the complex physical structure of nature, Mark Ritchie shows how species traits, particularly body size, lead to spatial patterns of resource use that allow species to coexist. He explains how this criterion for coexistence can be converted into a "rule" for how many species can be "packed" into an environment given the supply of resources and their spatial variability. He then demonstrates how this rule can be used to predict a range of patterns in ecological communities, such as body-size distributions, species-abundance distributions, and species-area relations. Ritchie illustrates how the predictions closely match data from many real communities, including those of mammalian herbivores, grasshoppers, dung beetles, and birds.

This book offers a compelling alternative to "neutral" theory in community ecology, one that helps us better understand patterns of biodiversity across the Earth.

"It is apparent that this book is the culmination of long and hard thinking about pattern in ecological communities, and how one might use the mathematics of fractals to develop a coherent thesis on how to integrate space and environmental heterogeneity into the theory of community structure. The work has a nice connection to classic thinking in community ecology. This is a well-written book."

—**Oswald J. Schmitz**, *Yale University*

"This is an ambitious book that takes ideas from existing equilibrium-based ecological theory and adds the innovation that population equilibria are determined by resource use in a heterogeneous environment. The ideas the author presents are stimulating. There is no doubt in my mind that this is an important, timely book."

—**Brian A. Maurer**, *Michigan State University*

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