

Preface

We humans are visual creatures. We are also introspective and curious, a combination that makes us all by nature amateur visual ecologists (even if we don't know it). Because our world is dominated by visual sensations, we naturally wonder how other animals see their particular worlds. When a cat is entranced by images of fish on a television screen, does it see their colors? Does it think they are real fish? What is it experiencing? When a wasp flies up and stares us in the face, just what is it seeing? These questions have probably been asked for as long as our species has been around. The third-century Roman philosopher Plotinus stated the fundamental principle of visual ecology nearly two millennia ago: "To any vision must be brought an eye adapted to what is to be seen, and bearing some likeness to it."

Still, the study of visual ecology didn't come into its own until near the end of the twentieth century. Researchers such as John Lythgoe in England and Bill "Mac" McFarland in the United States, to whom we have dedicated this book, first used the term "visual ecology" to describe their research on animal visual systems in nature. In 1979, Lythgoe published a smallish book titled *The Ecology of Vision*. The book introduced a new way of thinking about animal vision, relating the huge evolutionary diversity of visual systems to the environments inhabited by particular animals. Lythgoe presented unifying principles that involved several fields—visual optics, environmental radiometry, retinal physiology, visual aspects of behavior, and numerous others—that had historically been considered as separate.

Lythgoe, McFarland, and a few others like them made up the scientific generation who seeded the field, and the authors of this book were inspired as graduate students and young scientists by their elegant work and their personal charm. The four of us typify the field. We're international. Our home laboratories are in the United States, Sweden, and Australia, but we all consider the planet our field site and the animal kingdom our model organism. We spend time on ships, in woods and rainforests, in deserts, and in marshes, muddy waters, and coral reefs; we work in daylight, moonlight, starlight, and in the black depths of the world's oceans; our field sites cover six of the seven continents (and we envy the lucky few visual ecologists who have made it to Antarctica!).

Perhaps most importantly for the writing of this book, we are friends. We have known each other for decades, visited each other's home laboratories and actual homes, worked on the same teams in the field, published together, attended international meetings together, and shared long evenings in bars. Again characterizing the field as a whole, we really enjoy each other's company, and despite our natural competitiveness as scientists, we readily share our ideas, data, and students. We like each other, and that has gotten us through the difficulties that necessarily arise in a multiauthor project such as writing a book like this. We got a lot of pleasure out of just sitting back in an armchair to read each other's contributions—and equally much pleasure from constructively criticizing them!

Naturally, an effort like this involves many, many more souls than just the four of us. Laura Bagge, Jamie Baldwin, Nicholas Brandley, Mike Bok, Karen Carleton,

Jon Cohen, Kate Feller, Yakir Gagnon, Alex Gunderson, Elizabeth Knowlton, Dan Speiser, Cynthia Tedore, Kate Thomas, and Jochen Zeil read our chapter drafts. Tammy Frank, Ron Douglas, and an anonymous reviewer read and critiqued the entire manuscript. Judy Rubin contributed to the artwork, and we benefited from the graphic and photographic contributions of dozens of colleagues and associates. The team at Princeton University Press, especially our senior editor Alison Kalett, our editorial associate Quinn Fusting, and our production editor Karen Carter helped keep us on track and calmly sorted our differences of opinion when they inevitably arose. The entire manuscript was expertly and thoroughly copyedited by Elissa Schiff. Our graduate students and the other members of our laboratories kept us motivated with their own curiosity, their drive to carry the field forward, and their interest in seeing the final product of our labors. We are particularly indebted to Marie Dacke, Almut Kelber, Mike Land, Ellis Loew, Dan-Eric Nilsson, David O'Carroll, Jack Pettigrew, David Vaney, Rüdiger Wehner, and Jochen Zeil for their inspiration and encouragement. Most of all, we thank our wives, Roselind, Lynn, Sue, and Sara, for support throughout the project. None of them card-carrying visual ecologists, they nevertheless stuck with us as we wrote this book and gracefully put up with our global wanderings and consuming passion for science.