

PREFACE

Ancient drawings on the walls of caves speak for the ageless intrigue that animal behavior holds for human beings. In those days, the fascination was certainly motivated in part by survival; our ancestors were both predators and prey. There is some evidence that early humans also found animal behavior to be intrinsically interesting; the myths and stories that come down to us from prehistory contain elements of what animals do in the world and what they mean to people. These are the oldest statements of human relationship with the natural world and the living things that inhabit it.

Our ancestors would not recognize the far-flung universe of the modern science of animal behavior. Only 14 decades (approximately) have passed since Darwin first published *The Expression of Emotions in Man and Animals* – generally acknowledged as the starting point for the scientific study of animal behavior – and behavioral biologists now ask questions about topics ranging from the relationship of immunological phenomena and behavioral disorders in dogs, rats, and people to the integration of animal behavior and conservation. Experts in animal behavior provide commentary on the mating displays of rare primates, on television, where entire channels are devoted to the sensory worlds of insects and the ability of octopus to disappear in plain sight. In short, human fascination with animal behavior has produced a field that is rich beyond imagination, and frustratingly beyond the full embrace of any one person.

The almost hopelessly dispersed primary literature of animal behavior reflects the reticulated evolution of the field, which comes to us from field studies; from laboratory experiments; from our understanding of nerves, muscles, and hormones; and from our grasp of social interactions and ecology. It is difficult to think of a major area of biological inquiry that has not been touched by a behavioral tendril or two. A temptation exists to surrender to this fragmentation – allowing our intellectual landscape to reflect increasingly small and disjunct patches of thought and discovery.

Such surrender is, of course, distasteful to any scholar, but there is a more penetrating reason that makes it unacceptable: Anthropogenic change is occurring at a higher rate than ever before, and if we are to preserve our own habitat – the world that the ancients felt compelled to explain in their stories about animals – we must not fail in our attempts to understand its inhabitants. Those residents sustain our own habitat, and their requirements are varied, going far beyond calories and oxygen. They migrate and forage, choose mates, and defend territories, and all this behavior is influenced by hormones, external physical stimuli, trophic and social interactions, and eons of fitness outcomes. A fully integrated knowledge of animal behavior will be indispensable as scientists analyze changing populations, communities, ecosystems, and landscapes. Indeed, it will be indispensable for anyone who seeks to be an honest custodian of nature.

This encyclopedia offers over 300 authoritative and accessible synopses of topics ranging from dolphin signature whistles to game theory. As library reference material, the encyclopedia serves a public that is increasingly challenged to be aware of scientific advances. It is designed as a first stop for the curious advanced undergraduate or graduate student, as well as for the researcher desiring to learn about developments in fields related to his or her own study or to enter a new phase of inquiry.

In compiling this work, we contacted internationally known scientists in the broad array of fields that inform animal behavior. These accomplished men and women are the section editors, and they, in turn, invited some of the best scholars and rising stars in their subject areas to write for the encyclopedia. Thus, every contribution has been reviewed by experts. In short, the articles approach the best that our field has to offer, written by people whose passion for animal behavior is equaled only by their expertise.

Creating the list of sections was as daunting as it was enjoyable. Of course, we included traditional, major areas like foraging, predator–prey interactions, mate choice, and social behavior, along with endocrinology, methods, and neural processes, to name a few. You will see those and more as you survey these volumes. We also included areas that have recently captured the attention of an increasing number of behavioral biologists; these include infectious disease, cognition, conservation, and animal welfare. Looking to the future, we invited contributors from robotics and applied areas. We realized that we could not do the study of animal behavior justice without some exploration of the model systems – the landmark studies – that have molded and continue to guide the development of the field.

In general, you will not find human behavioral studies in this collection, although some articles are tangentially related to such work. That exclusion was a difficult decision, but was motivated not so much by some parochial commitment to a human/non-human divide as by the fact that the non-human literature itself is rich beyond description. Limiting the collection to non-human studies in no way removed the danger of intellectual gluttony.

We remember two eminent behavioral biologists in the dedication of this work – Professors Christopher J. Barnard and Ross H. Crozier. Both of these men played important roles in the creation of this work, and neither lived to see it come to fruition. Professor Barnard (1952–2007) was the first editor-in-chief of the encyclopedia and developed the initial overview of topics, but had to step back from the process because of the illness that eventually took his life. Professor Crozier (1943–2009) was the section editor of Genetics until his untimely death in late 2009. Their immense and varied contributions enriched our knowledge of animal behavior and are cataloged in numerous locations. Those contributions are remarkable in their scope and influence, but they are nonetheless dwarfed by the legions of students, friends, and family members who feel fortunate to have known these scientists and who will carry their legacy forward.

We are grateful to Dr. Andrew Richford, formerly the Senior Acquisitions Editor, Life Sciences Books, Academic Press, who guided us through the formative part of this project. His expertise in and enthusiasm for animal behavior provided significant momentum, not to mention some good fun. Simon Wood, Major Reference Works Development Editor, was indispensable to the project. He answered an amazing variety of questions from contributors and editors, kept the project organized and moving forward, and did all this without losing his fine sense of humor. Nicky Carter, Project Manager, guided us through the completion of the project, providing a pleasantly seamless interface between the scientific scribblers and other publishing professionals. We thank Kristi Gomez and Will Smaldon, also of Academic Press, for their roles in bringing the project to completion. Finally, working with the section editors (see pp. ix) was a real treat; their expertise and devotion to animal behavior is reflected in every page of this work. We particularly thank James Ha, Joan Herbers, James Serpell, and David Stephens for attending an organizational meeting to set the stage for the development of the project.

We are pleased to see this culmination of effort on the part of hundreds of authors and co-authors. Each article is the distillation of expert understanding, acquired over many years. We are excited to be part of such a remarkable collaboration, one that opens so many doors to the future of animal behavior for undergraduates and professionals alike.

Michael Breed, Boulder, CO
Janice Moore, Fort Collins, CO
August 2010