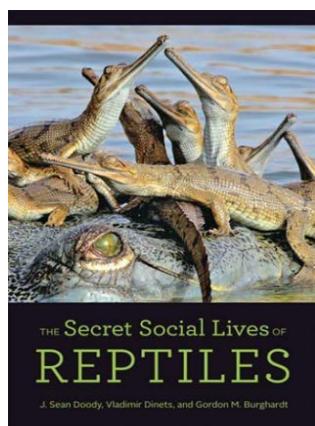


## The Secret Social Lives of Reptiles

J. Sean Doody, Vladimir Dinets & Gordon M. Burghardt  
Johns Hopkins University Press, ISBN 9781421440675, pp. 440



Why is it so difficult for us to imagine that reptiles might have intricate social lives? We have long studied and appreciated the complex social lives of birds (who are just one branch of the extant archosaurian reptiles). Could it be because we share endothermy and the resultant hyperactivity with birds? Like birds, we are stuck in high gear, burning fuel even when idling. We buzz quickly through

the lives of the more patient ectothermic reptiles, and then peevishly conclude that there's nothing interesting going on there.

The prevailing view of reptiles as less intelligent and socially stunted is not supported by evidence, as is made clear in this important new book. Rather the opposite is true: in many cases where researchers have taken the time to conduct careful observations and experiments, ectothermic reptiles exhibit clear signs of social complexity and other sophisticated cognitive feats. The stated goal of this book is not to present new analyses, but rather "...to present, with many examples and extensive literature, the remarkable diversity and complexity reptiles possess and to stimulate both wonder and creative new explorations in field, zoo, and laboratory." This book definitely succeeds on that level (and many others, as well). For example, did you know that the Australian sleepy lizard forms long term pair bonds that can last over 27 years? Or that American alligators participate in complex group courtship dance-displays that can involve 30 or more individuals? Or that within a vast woodland, dozens of individual female black rat snakes may all seek out the same rotting stump in which to lay their egg clutches? Or that adult New Zealand common geckos will hold branches belonging to different trees to form living 'bridges' that can be used by the very small neonates to move safely away from the daytime group shelter they all share? These and many similar examples are arresting, yet there is a deeper level. This book lays bare a broad gap in our understanding of our fellow terrestrial vertebrates and provides a summary of how we can start filling in that gap.

This is not a textbook—you can tell by the morphology: at 22 X 14 cm and 400 pages you can carry it around to read on

the bus, like your favorite hardcover novel. Its function is also not that of a textbook—it is not meant to lay out all details of all relevant research on the social behaviour of reptiles. Instead, it is meant to inspire. It is a call to action. Biologists studying social behaviour have largely created an inaccurate narrative about reptiles, and the authors have good reason to be dismayed. Their book is an extended argument that reptiles behave in ways much more complex and interesting than even professional herpetologists generally assume.

Although this is not a textbook, it is also not necessarily aimed at the casual reader. Rather, the intended audience includes researchers, dedicated amateurs, and others with a deep interest in the science of herpetology. The authors do an admirable job of explaining complex concepts from the scientific literature, but these discussions require familiarity with some terminology and a basic understanding of evolutionary biology. The book is mainly organised by taxonomy. Most of the chapters introduce a behavioural concept, and then discuss what is known in that field of study within tetrapods. Mammals, birds, and amphibians are discussed in brief, usually as an aspirational comparison to highlight the yawning gap in what we know about the social behaviours of those taxa in comparison to ectothermic reptiles. The social behaviours of the remaining tetrapod groups (the tuatara, snakes and lizards, crocodylians, and turtles) are reviewed thoroughly, with extra detail provided on systems where study of these animals may facilitate broader insights into the evolution of sociality. In addition, information that paleontologists have been able to glean from extinct lineages of non-avian reptiles is summarised and discussed throughout these chapters.

The book begins with two excellent introductory chapters which give a rather masterful short summary of the evolution of reptiles, including discussions of recent findings and debates regarding phylogenetic relationships and major evolutionary events. I found myself making notes throughout this chapter on the informed perspective provided by the authors—notes I plan on incorporating into my own Herpetology classroom the next time I offer the course (as an aside, I really loved the seamless inclusion of the Anthropocene into the evolutionary history of the reptiles). After this introduction there are specific topical chapters which offer detailed discussions of mating systems, social structure, communication, reproductive behaviour, communal egg laying, parental care, hatching, behavioural development, and a catch-all of additional social behaviours that are too sparsely studied to warrant full

chapters. The book is closed out by a forward-looking chapter that revisits the major topics and lays out the authors' vision for how to move research forward in these areas.

As the authors themselves note repeatedly, the level of detail provided concerning the social behaviours of different ectothermic reptile taxa is unbalanced. Although (excepting the tuatara) crocodiles are the smallest of these taxa, they have perhaps received the most attention in regard to social behaviour, and several sections of the book provide in-depth reviews and first-hand accounts of crocodylian behaviour. Because crocodylians are large, less secretive, and more active than most other ectothermic reptiles, we probably are better able to observe and understand their social lives. Perhaps this is not surprising—they are not only the most closely related to birds, but also seem behaviourally similar, with extensive auditory communication and a style of egg-laying and nesting that requires some level of parental care. However, the authors address the taxonomic imbalance by pointing again and again to the huge diversity of other reptiles about which we know basically nothing. The fact is, relatively few of the 10,000+ species of snakes and lizards are known to science beyond a basic description (and of course many thousands of additional species have not been described at all). The behavioural variety hidden in that vast unknown is sure to be staggering.

The book is full of broader insights. For example, at the beginning of Chapter 5, the authors point to three trends in the practice of science that have had a detrimental effect on our understanding of reptile behaviour and other natural systems: the concept of a 'model species'; the overemphasis on experimentation in a controlled laboratory setting; and the increasing focus on preregistration of scientific studies that lay out all the details of the planned experiment in advance. Of course these practices have a central place in scientific research, but, as the authors compellingly argue, they can never be used as a substitute for descriptive studies, opportunistic observation, and detailed accounts of natural history. All too often studies in captive laboratory environments fail to recreate the context that is necessary to see and understand the way animals interact with their environment in nature. Controlled studies are only applicable when scientists have developed enough understanding of a natural system to be able to formulate very specific hypotheses. And that understanding has to be developed from observational, quantitative natural history research that has (somehow) found a route to dissemination. Those routes are being choked off in most modern scientific journals, and if that trend continues, the raw material that scientists need to refine into controlled experiments will also dry up.

Another crucial insight that the authors highlight repeatedly is the value of variation in behavioral traits across ectothermic reptiles. The comparative method of examining the form and function of traits across different species of known relationship is the most powerful tool we have for understanding behavioural evolution, and this method requires variation across those traits to be present. In ectothermic reptiles, parental care is rarer and far more variable than in birds and mammals, arising and disappearing repeatedly across different taxonomic groups—the ideal setup for a detailed comparative analysis.

The book has other bonuses as well: an insightful foreword by Gordon W. Schuett does an excellent job of whetting the palate for the engaged reader. The colour plates in the center of the book are a nice addition, too, but if a picture is worth a thousand words, a video of behaviour is worth a thousand pictures (especially if it's at least 34 second at 30 fps...). The authors refer to video examples throughout, often referencing Youtube, which made me long for a digital supplement, some sort of repository where all these clips of interest had been assembled and annotated (a few URLs are given in the text).

All three authors of this landmark volume are accomplished researchers with dozens upon dozens of their own scientific publications, and a deep, collective grasp of the currently dispersed and idiosyncratic literature on reptile social behaviour. They have collaborated to produce a real gem of a book—a clearly written, logically organised, and impassioned (but deeply informed) scientific call to arms. Although anyone with an interest in reptiles or their natural history would benefit from reading this book, perhaps its greatest impact will be on the up-and-coming next generation of scientists. If you are still developing your own expertise or are casting about for an area of scientific inquiry in which to focus, this book is a treasure map—it highlights case after case of compelling (but often preliminary) observations that need further investigation. You should buy it, read it, and start marking up the margins, as I did, with excited exclamations and notes to yourself about the rich and complex and unexplored social world of some of the most misunderstood animals in nature.

Rulon W. Clark  
Department of Biology, San Diego State University  
E-mail: rclark@sdsu.edu

*Received: 5 October 2021*