

Pheromones and Animal Behaviour: Communication by Smell and Taste

Tristram D. Wyatt
Cambridge University Press, New York
2003, 391 pp.
ISBN: 0521485266 (soft)

Reviewed in *American Entomologist* (2004)

http://www.entsoc.org/pubs/periodicals/ae/book%20reviews/pheromones_and_animal_behaviour.htm

From the opening sentence on elephants and moths to the closing chapter on human pheromones, Tristram Wyatt has produced a well-researched and interesting treatise on chemical communication. Using a broad definition of the term pheromone, the author presents 13 chapters and three appendixes on chemicals that mediate animal interactions. Because of Wyatt's own background and the proliferation of research on arthropods, many of the examples arise from this group. However, Wyatt arduously attempts to cover a broad spectrum of species for relevant examples. In addition, the merging of the proximate and ultimate biological components with the chemical properties and analytical processes for identifying signals is one of the book's strong suits.

The overall feel and layout of the book are reminiscent of Krebs and Davies' classic introductory text on behavioral ecology (1993). In the first chapter, the terms used to discuss chemical signals are introduced, followed with a chapter on chemical techniques. Wyatt maintains an emphasis on function moving from sex pheromones in chapter 3 to succeeding topics on aggregation, scent marking and territoriality, social organization, recruitment, and alarm pheromones in chapters 4–8. Chapters 9 and 10 diverge a bit from the functional approach, bringing proximate issue to the forefront.

In chapter 9, Wyatt investigates chemical perception, neuroanatomy, and interpretation. Subtopics include discrimination of taste and smell, receptor proteins and neurons, and central processing. Greater depth is provided on the vomeronasal system in vertebrates and moth sensory structures. This is the longest chapter in the book; in the final sections, he discusses factors that affect responses to pheromones, primer effects, recognition and developmental pathways. Chapter 10 examines the physical dynamics of chemicals in the environment and how animals locate the source of the output. This is especially interesting because of the three-dimensional nature of orientation in air and water. The ensuing chapter, 11, strays from intraspecific signaling to illicit signals and receivers, discussing the interspecific selection factors and their outcomes on chemical signaling.

The text ends with two very easy to read and appealing chapters. The focus of the penultimate chapter is on the applications of pheromones in animal welfare, pest management, and conservation (this last topic could be greatly expanded). The final chapter explores the roles of chemical signals in humans, which while not exhaustive, provides a nice introduction to the topic.

Throughout the book, Wyatt provides a wide range of topics laced with examples whenever the published literature permits. As an example, in chapter 3 on sex pheromones, he introduces the concepts of sexual selection and mate choice and provides a table that gives chemical signal examples. The different mating strategies are covered along with sperm competition and speciation. Studies on marine worms, sea urchins, flies, crickets, bees, beetles, cockroaches, spiders, lobsters, moths, lampreys, salamanders, garter snakes, mice, hamsters, dogs, elephants, and humans are cited in

a single chapter. Hence, many of these chapters could be used as part of a course in behavioral ecology with chemical signaling illustrating the broader concepts.

The perspective is clearly biological, but Wyatt attempts to educate the behaviorist by weaving in the chemical structures, pathways, and means of isolating chemical signals. As an added bonus, two appendixes provide an easy review on chemical terminology. The literature cited is extensive and current, and the index is well managed. The writing is lucid with relatively few errors in content or presentation.

I used the book in a seminar with eight graduate students pursuing the M.S. degree in biology. The students found the book quite readable. A few disliked the use of boxes, considering them disruptive to the flow. Some thought that the chemistry was overemphasized, but they also realized the benefit of the integrative presentation. A reasonable number of figures were taken directly from the original source but were lacking in quality or clarity in relating to the text. The integration of data throughout the book permits discussion of particular studies, as well as broader patterns in chemical ecology.

A second edition could improve on the overall organization. The length of chapters is highly variable from 14 to 40 pages. For use as a text during a semester, 13 chapters are probably too many to cover adequately given the 300 pages. Three of the chapters could be merged and synthesized. Chapters 4 (aggregation), 7 (recruitment), and 8 (fight or flight) are a combined 45 pages. Some of the information is repetitive within these chapters and across other chapters such as number 6 on social organization. With slight reorganization and reduction, the text could be streamlined and made highly functional for an upper-level undergraduate class all the way to a doctoral seminar.

In some chapters, Wyatt successfully suggests further avenues of research (e.g., in studying fish alarm behavior, he suggests that “more underwater video of field responses would be helpful,” p. 159) or mentions the challenges in pheromonal studies (e.g., chapter 13 and the difficulty of rigorous, well-controlled studies with humans). Such personal touches and suggestions could be used more often as they tend to spark deeper thought by readers.

Overall, *Pheromones and Animal Behaviour* is enjoyable reading and a highly successful endeavor that can serve as a course text, an update on the field, or a reference book.

Acknowledgments

Georgia Southern University graduate students Katherine Bagley, Jessica Brzyski, Chifuyu Horikoshi, Anne Marie LeBlanc, Helen Loizi, Christen Merte, John Smoyer and Dhaval Vyas provided valuable comments on the text.

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