

Pheromones and Animal Behaviour

Communication by Smell and Taste

We are entering one of the most exciting periods in the study of chemical communication since the first pheromones were identified some 40 years ago. The rapid progress that has been made is reflected in this book for advanced undergraduates and researchers, which is the first to cover the whole animal kingdom at this level for 25 years. The importance of chemical communication is illustrated with examples from a diverse range of animals including humans, marine copepods, *Drosophila*, *Caenorhabditis elegans*, moths, snakes, goldfish, elephants and mice. The book is designed to be advanced and up to date, but at the same time accessible to readers whatever their scientific background. For students of ecology, evolution and behaviour, it gives an introduction to the rapid progress in our understanding of olfaction at the molecular and neurological level. In addition, it offers chemists, molecular biologists and neurobiologists an insight into the ecological, evolutionary and behavioural context of olfactory communication.

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Tristram D. Wyatt

University of Oxford



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Dedicated to Martin C. Birch, Joan and Vivian, and Robert

I should think that we might fairly gauge the future of biological science, centuries ahead, by estimating the time it will take to reach a complete, comprehensive understanding of odor. It may not seem to be a profound enough problem to dominate all the life sciences, but it contains, piece by piece, all the mysteries.

Thomas L. (1983). *Late night thoughts on Mahler's ninth symphony*. New York: Viking Press.

Until recently, the chemical senses have engendered, relative to the other major senses, comparatively little attention on the part of the scientific and medical communities. This is due to a number of factors, including (1) the lack of a simple physical dimension analogous to wave length that correlates with olfactory or taste quality, (2) the fact that chemosensory dysfunction rarely produces obvious influences on such everyday activities as locomotion and social interaction, and (3) the widespread belief that chemical senses are of little importance to humans.

Doty, R. L. (1995) Introduction and historical perspective. In *Handbook of olfaction and gustation*, ed. R. L. Doty, pp. 1–32. New York: Marcel Dekker.

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Preface

Pheromones offer exceptional opportunities to study fundamental biological problems. Recent progress in the field is rapid. The excitement comes from the convergence of powerful techniques from different areas of science including chemistry and animal behaviour, combined with new techniques in genomics and molecular biology. For perhaps the first time, we can now investigate questions at every level: molecular, neurobiological, hormonal, behavioural, ecological, and evolutionary.

The discoveries from molecular biologists are likely to greatly expand our knowledge of the evolutionary biology of olfactory communication. Equally, molecular biology only makes sense in the context of evolution. Pheromone research almost always brings together biologists of many kinds and a rich diversity of chemists – each is approaching the other parts of the study as a non-specialist. This book is designed to bridge those gaps and to bring together people already working on pheromones and to encourage others to take up the challenge.

Different parts of the book emphasise examples from different taxa. For example, mammals feature more strongly than invertebrates in the sections on individual variation and hormonal effects of pheromones, but invertebrates dominate the chapter on searching behaviour. Because of pressure of space, the literature citations in the text are more to offer a way into the current literature than to give full credit for discoveries.

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I am enormously grateful to all the scientists who advised me and kindly sent reprints and pre-prints of their work. The book would not have been possible without their help and generosity. In keeping the range of animal groups represented as wide as possible, I have had to be selective. Inevitably I have not been able to include many examples that I would have liked to. I apologise to authors whose research I was not able to describe here despite its high quality.

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