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the historical and narrative approach taken here and the more experimental approach taken by ecologists. Ecology might gain much from the approach taken by environmental history, but environmental history might also benefit from a more ecological approach at times. Surely, and as *Environmental Histories of New Zealand* makes clear, if we are to effectively manage fragile landscapes such as those of Aotearoa-New Zealand, it is imperative that we understand the complex and multilayered stories and perspectives that make up our past.

GEORGE PERRY

*School of Geography and Environmental Science
University of Auckland, Auckland, New Zealand
Email: george.perry@auckland.ac.nz*

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Pheromones and Animal Behaviour

Tristram D. Wyatt. Cambridge University Press, Cambridge, 2003, xv + 391 pages. Price AUD \$99. ISBN 0521 48526 6.

Learn about the female sex-pheromone that 140 species of moth and the Asian elephant (*Elephas maximus*) have in common and more importantly, learn why elephants don't try to mate with butterflies in *Pheromones and Animal Behaviour*, an excellent, up-to-date review of the role that pheromones play in communication between individuals. Throughout the animal kingdom, pheromones are involved in more interactions than any other type of communication signal. From path following in social animals to mate choice and territorial defence, pheromones mediate a wide range of animal interactions and behavioural responses. Clearly pheromones are an ubiquitous part of the animal kingdom, and so why has it taken over 40 years for research into chemical communication to develop into a strong discipline? Perhaps as the book suggests the dominance of sight and hearing in humans has influenced the value we place on non-visual communication in the animal kingdom.

Pheromones and Animal Behaviour is organized into 13 easy to read chapters that deal with a range of topics from the history of pheromone research to the role that pheromones play in human mating behaviour. The first two chapters provide a brief introduction to chemical communication, the history of isolating and identifying the chemical compounds used in communication, and define the terms used throughout the scientific literature. These chapters provide the reader with a strong foundation in the topic and the book would be an ideal text for advanced undergraduate courses as well as providing postgraduate students and academics with a fantastic starting point for research on the role of pheromones in animal behaviour.

Each of the remaining chapters deals with a specific topic including: (i) finding and choosing mates – why and how did pheromone signalling become involved in mate selection; (ii) scent marking and territorial defence – what information is conveyed through scent marking and are markers an effective barrier to intruders; (iii) social organization – the role of pheromones and behaviour in the inhibition of sexual development in subordinates; (iv) recruitment – what cues do larval stages follow when choosing a settlement site; (v) alarm pheromones – why did they evolve; (vi) the molecular basis of behaviour – highlights recent advances in our understanding of the way that animals detect chemical signals and the molecular basis for behavioural responses; (vii) illicit receivers and signalers – cracking the code, the exploitation of pheromone signalling by conspecifics, predators and competitors; and (viii) the final chapter deals with the recent discovery of the important role that pheromones play in human mate selection. Each chapter provides an overview of current research in that particular topic and the concepts raised are illustrated with examples from a diverse range of taxa. *Pheromones and Animal Behaviour* uses examples from both invertebrates and vertebrates to illustrate the points raised and this is a refreshing change for behavioural texts, which often maintain a sometimes unjustified distinction between animals with and without backbones. In addition to the references cited within the text, Wyatt suggests further reading at the conclusion of each chapter for those who want to increase the depth of their knowledge. The book is accessible to readers from a range of scientific backgrounds. It covers the ecology and evolution of pheromone mediated animal behaviour and also details the recent advances in our understanding of the role of olfactory communication at the neurological and molecular level. The chemical structure and nomenclature of organic molecules is introduced in the appendices so that the non-chemist can easily understand the concepts of three dimensional structure in organic compounds and how the different isometric structures of an organic compound can

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influence its effect on target organisms without having to retreat to the library.

Pheromones and Animal Behaviour is clearly written and comprehensively researched. It provides adequate detail without getting bogged down in minutia and because it was written by a single author there is a continuity and cohesion often missing in collaborative work. My main criticism of the book is the choice of monochromatic illustrations. While they are generally suitable for illustrating the majority of points there are some figures in which it was hard to identify the structures of interest and these illustrations would have benefited from being reproduced in colour. The second issue I have with this book is the attention to detail in the layout design. Some of the captions don't correspond to the position of the figure and it is not always clear to which figure a particular caption belongs. These are minor problems that do not significantly affect the scientific tenor of the book, but they are annoying and detract from the overall experience gained from reading the book.

DEREK TURNBULL

*School of Zoology, University of Tasmania
Hobart, Tasmania, Australia
Email: Derek.Turnbull@utas.edu.au*

Tropical Forests and Global Atmospheric Change

Y. Malhi and O.L. Phillips (eds). *Philosophical Transactions of the Royal Society: Biological Sciences*, London, 2004, 250 pages. US \$74.50 ISSN 0962-8436.

The rationale behind this theme issue was to bring together a collection of papers from a wide range of disciplines to focus attention on the fate of the world's tropical forests as a consequence of recent global atmospheric change, emphasizing new field data or new syntheses of existing data. For the most part it achieves this aim, albeit with a bias towards neotropical forests. After a short introduction by the editors, the volume is organized into four sections that follow the key disciplines contributing to our knowledge and understanding of the effects of global atmospheric change on tropical forests and concludes with a useful synthesis paper, drawing together the critical elements of the 15 contributed papers.

Section 1 (The changing tropical atmosphere) contains three papers, beginning with Malhi and Wright who examine spatial patterns and recent trends in the climate of tropical forest regions over the period 1960–1998. While a high degree of certainty exists for increases in temperature regimes in

the tropics over coming decades, the greatest uncertainty is how tropical precipitation regimes will respond to changes in the global atmosphere. This will impact on studies attempting to predict impacts of global warming on biodiversity and water balances. Cramer *et al.* give a comprehensive overview of impacts of atmospheric carbon dioxide, climate change and deforestation on tropical forests and the global carbon cycle, and suggest that deforestation will probably produce large losses of carbon into the atmosphere, despite the uncertainty about the deforestation rates. Laurance examines forest-climate interactions in fragmented tropical landscapes at several spatial scales, and concludes that given the rapid pace of forest conversion in the tropics, care must be taken to distinguish the consequences of global-change phenomena from the ever-increasing effects of landscape alteration.

Section 2 (Contemporary change in tropical forests) contains four papers, based entirely on Amazonian forests. This limitation makes it difficult to generalize to tropical forests in Africa and Asia where there are fundamental differences in climate and land-use change patterns. Baker *et al.* discuss increasing biomass in Amazonian forest plots using new data, and show that there has been a regional-scale carbon sink in old-growth Amazonian forests over the past 20 years. Barlow and Peres focus on ecological responses to El Niño-induced surface fires in the central Brazilian Amazonia, and show a combination of El Niño-induced drought and land-use change has dramatically increased fire frequency in humid tropical forests in Brazil and elsewhere. Significantly, rates of tree mortality and changes in forest structure are strongly linked to burn severity, with strong implications for biomass loss, carbon emissions and faunal responses. Phillips *et al.* give an overview of pattern and process in Amazon tree turn over from 1976 to 2001, and confirm previous work that has shown tree turnover rates, tree biomass and large liana densities have all increased in mature neotropical forests over the last 50 years. Chave *et al.* discuss error propagation and scaling for tropical forest biomass estimates, and conclude that more work needs to be done to improve the predictive power of allometric models for biomass studies.

Section 3 (Understanding the present: interpreting contemporary change in tropical forests) contains five papers. Lewis *et al.* begin by examining concerted changes in tropical forest structure and dynamics, using data from 50 long-term plots in South America. They demonstrate that continental-wide increases in solar radiation, coupled with increases in atmospheric concentrations of carbon and higher air temperatures, may have increased resource supply in this time, thereby causing accelerated growth and increased dynamism across the world's largest tract of tropical