



## Forensic Entomology: International Dimensions and Frontiers

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# Book Reviews

Tomberlin JK and Benbow ME [eds.]. 2015. *Forensic Entomology: International Dimensions and Frontiers*. CRC Press, Boca Raton, Florida, USA, 433 pp. ISBN 9781466572409, US\$99.95 (hardback)

*Forensic Entomology* contains 31 chapters written by 68 scientists from around the world. Although chapters in the first half of the book were written principally by entomologists, the second half of the book has chapters written by statisticians, soil scientists, population ecologists, parasitologists, and microbiologists, to name just a few. The book is separated into 5 sections:

Parts I–IV: These sections detail the history, accomplishments, and challenges of forensic entomology by geographical regions further separated into countries in Australasia, Europe, Africa, and the Americas.

Part V: These sections include chapters regarding experimental design, inferential statistics and computer design, Bayesian statistics, and predictive modeling. There are also chapters regarding decomposition microbiology, soil chemistry, molecular biology, engineering, behavioral and community ecology, and a chapter about use of surface hydrocarbons for identifying age and species of forensically important arthropods. The last 3 chapters discuss standard practices, international collaborations, and current global trends as related to the forensic sciences discussed in the book.

I found each of the chapters to be well written. The editors succeeded in compiling much of the history, current state, and future of forensic entomology and its related fields for this book. As would be expected, some chapters have less substance than others.

The editors acknowledged in the preface that contributing authors used different terms to describe a biological phenomenon. This is most apparent when the acronym PMI (postmortem interval) is used, which is defined as the time since death. The time since death is usually the primary question that law enforcement personnel want answered when they consult a forensic entomologist. Of course, the time since death may not be desired just of a human decedent. Forensic entomologists have been involved in cases regarding animals, such as dogs and roosters. To determine a PMI, forensic entomologists take into account many things, such as time of year, whether the body was indoors or outdoors, covered, etc. That there is no commonly accepted term is evident (and somewhat frustrating) in this book, where you will find PMI, min-PMI,  $PMI_{min}$ , minimum PMI, mPMI, and PCI (post colonization interval, which is not the same as PMI), depending upon what chapter you are reading. As is acknowledged multiple times in the book, forensic entomologists need to come to a consensus regarding standard practices and terminology, especially with this one basic term.

I liked the inclusion of forensically important species by country as I am interested in speaking with others who study the same species as I do. Many authors listed forensically important species in a handy table (or tables), whereas other authors mentioned their regional species in the text. A few authors provided no information at all about species found in their respective regions. For example, authors from Italy and Spain did not include species found in their countries, but included in the Italy chapter is a full-page figure of the Italian State Police and a figure detailing the structure of the Carabinieri. The Spain chapter has a figure of the hierarchic structure of departments involved in legal investigations. I do not see the usefulness of these figures as they pertain to forensic entomology, and feel that the figures were included as filler

for these smaller chapters. To keep the first 18 chapters consistent, the editors should have requested that insects of forensic importance be presented in the same manner, preferably in table format.

There are 6 pages of color inserts. The first is a figure presenting publications about forensic entomology from throughout the world. This figure is small, low resolution, and should have been presented in landscape format. There is a small, blurry photo (but at least it is in landscape format) of the first North American Forensic Entomology Association (NAFEA) meeting held in Las Vegas in 2003. As the Eastern Association of Forensic Entomology (EAFE) is mentioned, perhaps a photo of this group should have been included in the book as well (or neither group photos)? Also in the inserts are 2 pages of color figures (if you call black-and-blue a color figure) regarding publications by country. These should have been left out of the insert section. But these are minor issues and could easily be addressed in a 2nd edition.

The second half of the book contains chapters on newly emerging fields such as Bayesian statistics (specifically Bayesian Belief Networks or BBNs, Chapter 20). BBNs may be appropriate for use in determination of a PMI, but the author included many overly complex figures to illustrate its theoretical use for forensic entomology. The figures were difficult to read due to small font size in both the black-and-white and color inserts. The chapters on forensic decomposition microbiology (Chapters 21 and 22) are of great interest, but I found the 3 full pages of universal primers (Chapter 22) for genetic analysis of bacteria, archaea, and fungi not necessary for inclusion in this book. Chapter 23, the applications of soil chemistry that can be used in conjunction with forensic entomology to determine a PMI, is one of the best-written and most interesting sections in the book.

The chapter addressing experimental design, inferential statistic, and computer modeling (Chapter 19) is the most important chapter in the book. An earlier version by the same authors was published in the *Journal of Medical Entomology* in 2012 (49[1]: 1-10). The authors updated their analyses of peer-reviewed publications for inclusion in this book. In total, 103 publications were reviewed for this chapter. Sadly, the frequency of published studies with pseudoreplication has not changed over a period of 30 years. Only 19% of the publications reviewed had adequate experimental design and statistical analysis. This is a huge embarrassment for scientists in our field and needs to change, but the editors deserve praise for including this chapter in the book. I would require this chapter as a reading assignment for any graduate student hoping to study forensic entomology.

The other chapters discuss molecular biology, engineering (yes, there is an app for that), behavioral ecology, community ecology, use of surface hydrocarbons for identification and aging of specimens and determination of PMI, standard practices, international collaborations and training, and current global trends and frontiers; all are informative. The chapters in the second half of the book serve to bridge the field of forensic entomology to these other important fields of forensic sciences. Collaborations of scientists using many of the sciences discussed in the book would be useful, especially for validation of timelines.

This book was is not meant to be a textbook, as were the books written by Dorothy Gennard (Forensic Entomology: An Introduction) and David Rivers and Gregory Dahlem (The Science of Forensic Entomology), nor could it really be classified as a reference book, as I would describe Jason Byrd and James Castner's Forensic Entomology: The Utility of Arthropods in Legal Investigations. Overall, I found Forensic Entomology: International Dimensions and Frontiers to be very informative. It is an overview of the state-of-the-art of forensic sciences

related to medicolegal entomology. Anyone interested in studying forensic entomology could glean a great deal (the good and the bad) from reading this book.

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