

## BOOK REVIEW

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# Review of: *Soil Analysis in Forensic Taphonomy: Chemical and Biological Effects of Buried Human Remains*

**REFERENCE:** Tibbett M, Carter DO. *Soil analysis in forensic taphonomy: chemical and biological effects of buried human remains*. Boca Raton, FL: CRC Press, 2008, 340 pp.

This text is divided into 11 chapters and has 16 contributors. The text provides the reader with a brief overview of the principles and methods used in forensic taphonomy and deals with the forensic evidence that can be obtained from soils, primarily in and around the corpse in a grave vault. The chapters are short and are divided into multiple sections giving the reader only a glimpse of the complexity associated with soil analysis and interpretation. The references associated with each chapter are quite extensive and more than compensate for the lack of detailed descriptions in the various chapter texts.

The first chapter deals with forensic comparisons of soils and deals primarily with morphological components of soils such as consistency, thickness, texture, structure, and color and describes some analytical techniques which can be used to compare soils other than simple visual comparisons. One glaring omission in this section deals with the United States Department of Agriculture (USDA) rules on transporting soils from one area to another (i.e., from the crime scene to the laboratory). Many counties in the U.S.A. (especially in the South) are quarantined for fire ants, nematodes, or a variety of other insects, parasites, or molds, and transportation of soils (even intra-state) may require either USDA permission (registration with the USDA) or a USDA permit depending on where the soils originated from. No doubt other countries also have such rules.

Chapter 2 discusses the decomposition process. The discussions of the stages of decay and the factors influencing decomposition are described in only the broadest terms, but the reference section is quite impressive and includes many who are well-known for their work in this area. Above ground and below ground decomposition is discussed separately and the text covers many of the most important factors of decay with the exception of the partial pressure of oxygen.

Chapter 3 deals with the role of organisms in decomposition and discusses some interesting redox reactions by microorganisms in the soil and touches upon the fate of organic and inorganic components in the subsurface. I feel an expansion of this chapter would be helpful, as soil types (e.g., clay vs. sandy loam, etc.) are not discussed and greatly affect the soil microorganisms as well as the plant growth surrounding decompositional events. This chapter also has a very nice chart summarizing the factors which affect the decomposition process.

Chapter 4 is a very nice summary of soil fungi associated with graves. The constant use of acronyms such as postputrefactive fungi (PPF), ammonia fungi (AF), etc. make the reading somewhat laborious, but if you keep them all straight you will find this chapter quite informative. While many fungal pictures are included in the text and the PPF and AF are listed in the appendix, this is not designed to be used as an identification guide, but does make the case for forensic mycology to be included in the forensic science tool kit.

The role of invertebrates is discussed in Chapter 5 and is a nice overview of invertebrates (flies, beetles, spiders, etc.) that are associated with decomposition (especially on buried bodies). The authors touch upon the lack of research in this field of study (especially for postmortem interval determinations) in respect to the myriad of soil types and vegetation that will affect the invertebrate fauna.

Chapter 6 discusses the decomposition of hair in the burial environment. It outlines the structure, growth, and function of hair and how the environment and microorganisms can alter hair fibers. I was pleased to see that the author addresses safeguarding hair evidence recovered at a scene, as many are unaware of changes that may occur in collected hair evidence by improper storage and treatment. This chapter also has an excellent reference section.

A summary of the survival of textiles and other materials is thoroughly discussed in Chapter 7. This is a particularly interesting chapter as little is known about the decomposition of synthetic materials in various environmental settings. I consider this chapter a must read for the investigator. The pictures (many in color, some duplicate photos in black and white) are helpful. Slightly confusing was the fact that all the color pictures for each chapter were grouped together in this section, so you must pay attention to the figure number (which should correspond to the chapter) or you will get lost. Also some of the black and white photos were duplicated in color in this section. The appendix to this chapter on material compositions is also quite useful, but I would have liked to have seen some rule of thumb decomposition rates in this section which have been previously published.

The next chapter is a very brief overview of the decomposition of organic tissue constituents (proteins, carbohydrates, and lipids). The descriptions are short, non-technical, and a very nice discussion of adipocere formation is included. Here the author finally discusses how soil can affect the decompositional rate and the references for the entire chapter are superb.

Chapter 9, while a very nice summary of postmortem interval (PMI) techniques, has very little to do with soil *per se* other than the one technique developed for PMI by analyzing organic and inorganic

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markers mentioned in the forensic taphonomy section. The major sections include anthropology, entomology, radioisotopes, odontology, and botany. Fortunately, palynology is also mentioned, but should have received more consideration than half a page. Post burial interval (PBI) is poorly defined in the text and can be confused with PMI. The use of PBI can be quite confusing to laymen reading this chapter and readers should be quite cognizant of which term is being used for what application as they mean different things.

The following chapter on methods of measuring microbial activity and biomass is excellent. It is complete and thorough, but lacks a detailed section how this information can benefit forensic science investigations. The author mentions only one paper that links the two topics when in fact there are a number of articles that do so, but the chapter is nevertheless a must read to anyone wishing to study soils.

Chapter 11 is also excellent and should be required reading. It puts into perspective the value of soil analysis, discusses sampling and handling of soils, reviews analytical techniques and procedures which can be applied to soils, expands on palynology, and touches upon combined approaches which are critical in this field of study.

In summary, the text generally does not go into too much detail, but is heavily referenced which is very useful for those wishing to delve deeper into the various topics. Many very interesting topics are discussed and anyone (especially beginners) who deals with issues in forensic taphonomy should have this volume on their shelves. While there are an unusual number of typographical errors throughout and the color picture section is confusing, valuable information can be gained from reading this book.