

BOOK REVIEW

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Review of: *Hair in Toxicology: An Important Bio-Monitor*

REFERENCE: Tobin DJ, editor. *Hair in toxicology: an important bio-monitor*. Cambridge, England: RSC Publishing; 2005, 355 pp.

Overview: This book is a useful, if somewhat unusual, addition to the science of hair analysis for various areas of toxicology. The scope is ambitious and extensive, taking in forensic, clinical, environmental applications of hair analysis, yet also including valuable chapters on the chemistry and toxicological effects of personal hair care treatments. A final section on the value of hair as an archeological sample makes for very interesting reading.

The text itself is broken into four parts:

In Part 1: *The Biology of Hair*, The Editor, who also authored the first three chapters, delivers information about the physiology, growth rate, composition, and pigmentation of hair, in a style that makes information easy to absorb. The effect of ethnicity, gender, age, disease, diet, and cosmetic use on hair growth rate, as well as body site variation is addressed in the early chapters. A description of the biosynthesis of melanins is given, important for their role in visible hair color, with eumelanin predominantly responsible for black/brown hair coloring and pheomelanin responsible for red/blonde pigmentation. The chapters are also well interspersed with electron micrographs of hair follicles, and schematic diagrams of hair in its various cycles of growth. The section contains a significant amount of background information and is well worth the venture into its pages.

In the second section, entitled *The Application of Hair Biology to Environmental Assessments*, the chapters on metal and mineral analysis in hair, as well as the use of hair specimens for nutrient and diet assessment, are both well balanced, indicating the limitations of analytical techniques as well as the advantages. However, as mechanisms known to cause variation in hair growth have been extensively described in earlier chapters of the book, the advocating of segmental analysis in order to determine the precise time of drug exposure in criminal cases seems to be oppositional.

The ability to use hair for identification purposes is a significant resource for forensic sciences. Advances in microscopy and DNA sequencing techniques, as well as the application of the science to paternity tests and criminal cases are well described. In contrast, the short section on surface chemical analysis is somewhat disjointed and inconsistent.

Section 3: *The Chemistry and Toxicity of Personal Hair Products* includes areas discussing the chemistry of bleaches and dyes, etc., as well as the toxicology associated with their use, such as their potential link to skin allergies, and various forms of cancer. While epidemiological data does appear to be inconsistent, the chapter gives a comprehensive view of the state of the science. The potential risk for beauticians and barbers was particularly interesting, although there appears to be no convincing evidence yet that occupational exposure to the hair treatments is associated with an increased risk of cancer. Thankfully, shampoo, conditioners, wavers, relaxants appear to be safe to use, and the regulation of these products in several countries is well documented in the book.

Finally, *Hair as a Resource in Archeological Study* shows hair to be a unique specimen for historical investigation. Apparently, the oldest hair dated so far using radiocarbon techniques is from a bison, aged at a mere 64,800 years! The problems associated with archeological specimens are addressed, and again, some controversial aspects of hair analysis for diet and disease assessment are discussed.

Overall, the book is an excellent addition to the library of scientists interested in various areas of hair analysis. Most of the book flows well and is easy to read. There is an extensive index providing easy access to sections of interest, and it will be a useful reference tome for my bookshelf.

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