PROFESSIONAL ISSUES
IN FORENSIC SCIENCE
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Max M. Houck, PhD, FRSC is an internationally recognized forensic expert with research interests in anthropology, trace evidence, education, and the fundamentals of forensic science, both as a science and as an enterprise. He has worked in the private sector, the public sector (at the regional and federal levels), and in academia. Dr. Houck has published in a wide variety of areas in the field, including books, book chapters, and peer-reviewed journals. His casework includes the Branch Davidian Investigation, the September 11 attacks on the Pentagon, the D. B. Cooper case, the US Embassy bombings in Africa, and the West Memphis Three case. He served for six years as the Chair of the Forensic Science Educational Program Accreditation Commission (FEPAC). Dr. Houck is a founding coeditor of the journal *Forensic Science Policy and Management*, with Dr. Jay Siegel; he has also coauthored a major textbook with Dr. Siegel, *Fundamentals of Forensic Science*. In 2012, Dr. Houck was in the top 1% of connected professionals on LinkedIn. Dr. Houck lives and works in the Washington, DC, area.
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“The best thing for being sad,” replied Merlin, beginning to puff and blow, “is to learn something. That’s the only thing that never fails. You may grow old and trembling in your anatomies, you may lie awake at night listening to the disorder of your veins, you may miss your only love, you may see the world about you devastated by evil lunatics, or know your honor trampled in the sewers of baser minds. There is only one thing for it then—to learn. Learn why the world wags and what wags it. That is the only thing which the mind can never exhaust, never alienate, never be tortured by, never fear or distrust, and never dream of regretting. Learning is the only thing for you. Look what a lot of things there are to learn.”—T.H. White, The Once and Future King

Forensic science has much to learn. The breadth of the discipline alone should render any reasonably learned person dizzy with expectations; insects, explosives, liver functions, DNA, firearms, textiles, adhesives, skeletons, and so on the list goes on forever. That is because anything, truly anything, can become evidence, from a single fiber to an entire ocean liner. Forensic science does not lack for specialized knowledge (some might stay too specialized), but what it is wanting is knowledge that is comprehensive, integrated, and foundational. Introductions to forensic science abound, and many highly specialized texts are also available, but a gap exists between the two: a bridge from novice to practitioner. As the 2009 NRC report noted:

Forensic science examiners need to understand the principles, practices, and contexts of scientific methodology, as well as the distinctive features of their specialty. Ideally, training should move beyond apprentice-like transmittal of practices to education based on scientifically valid principles. (NRC, 2009; pages 26–27).

The Advanced Forensic Sciences Series seeks to fill that gap. It is a unique source, combining entries from the world’s leading specialists who contributed to the second edition of the award-winning Encyclopedia of Forensic Sciences and organizing them by topic into a series of volumes that are philosophically grounded yet professionally specialized. The series is composed of 12 volumes that cover the breadth of forensic science:

1. Professional Issues
2. Biology
3. Chemistry
4. Fingerprints
5. Firearms
6. Materials Analysis
7. Pathology

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8. Anthropology
9. Engineering
10. Behavioral
11. Digital and Documents
12. Toxicology and Drugs

Each volume contains sections common to all forensic sciences, such as professionalism, ethics, health and safety, and court testimony, and sections relevant to the topics in that particular subdiscipline. Pedagogy is included, providing review questions, discussion questions, the latest references in additional readings, and key words. Thus, each volume is suitable as a technical reference, an advanced textbook, or training adjunct.

The *Advanced Forensic Science Series* provides expert information, useful teaching tools, and a ready source for instruction, research, and practice. I hope, like learning, it is the only thing for you.

*M. M. Houck, PhD, FRSC*
*Series Editor*

**Reference**

Unless you are a biologist or physicist, the world is centered on chemistry. Even then, biology and physics rely on chemistry to function. Forensic science, despite the emphasis on DNA since it roared onto the scene in the late 1980s, relies extensively on chemistry and materials analysis. Based on data from operational laboratories, chemistry services comprise almost 60% of the work a typical forensic laboratory conducts. In fact, if one argues that DNA analysis is nothing more than chromatography, all that is left is digital evidence, fingerprints, and firearms; the latter two utilize chemistry to a degree, of course.

Instrumental chemistry is obviously important, but so is morphology; the shape things take relies, in part, upon their molecular makeup. The ability of a chemical method to resolve differences between two otherwise similar objects is why it is useful in forensic science. Every method has a resolution to it, a limit of specificity. In fact, the basis of the forensic sciences is this diagnostic city. Each method must have the ability to assign evidence (trace bits of objects) to its originating object with a degree of certainty. The greater the degree of certainty of assignment, the more powerful the method is. This is the basis for classification and interpretation of evidence. Identifying whole objects is one thing; identifying traces of that object is only a start in forensic science. What constitutes a significant difference between two otherwise analytically similar objects depends on, among other things, the following:

- the raw materials, their proportions, and content;
- the intermediate processes and their affect on the raw materials and finished goods;
- the quality control and assurance levels utilized at various points along the supply chain; and
- the methods used to analyze the items.

Forensic chemistry is in the enviable position of being able to measure what it analyzes. It is inherently quantitative. The trick of interpretation is, frankly, that the world is a big and complex place. Supply chains are networked, global, subject to economic variables, and can be subverted or faked. This makes sorting out objects difficult and sorting out traces of those objects even more difficult, sometimes impossible. Forensic scientists need to understand the manufacturing basis of those things that they analyze to better interpret the results. Moreover, their methods must be accurate, precise, and reliable.

This volume in the Advanced Forensic Science Series covers the core of forensic chemistry for education and training purposes. It can also act as a technical reference for those practitioners in the field. This text encapsulates the long history of not only forensic chemistry but also chemistry itself and represents the culmination of those tools that we successfully use today in criminal investigations and legal proceedings.

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1 The FORESIGHT Project, www.be.wvu.edu/forensics