Advances in Fingerprint Technology

SECOND EDITION

EDITED BY

Henry C. Lee and R. E. Gaensslen

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CRC Press
Taylor & Francis Group
6000 Broken Sound Parkway NW, Suite 300
Boca Raton, FL 33487-2742

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Version Date: 20130214

International Standard Book Number-13: 978-1-4200-4134-7 (eBook - PDF)

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Composition of Latent Print Residue

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ROBERT S. RAMOTOWSKI

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Introduction

The composition of human perspiration has been studied and reported extensively in the medical literature. The medical community has analyzed sweat for many purposes, including attempts to diagnose certain diseases, such as cystic fibrosis, and studies of skin conditions, such as acne. Even the perfume and cosmetics industry has an interest in determining the precise chemical nature of perspiration and how it might interact with their personal hygiene products. However, the information ascertained in these studies does not begin to address the issue that is most critical for forensic scientists. Knowing the precise contents of the various skin glands does not accurately represent the nature of what is actually secreted onto substrates from the fingers and palms. In operational scenarios, numerous contaminants are present in the fingerprint deposit, including material from other glands, cosmetics, perfumes, and food residues. In addition, the secreted material is almost immediately altered by oxidative and bacterial degradation mechanisms. These factors are particularly important since crime scene technicians seldom encounter latent print deposits immediately after they are deposited by a perpetrator. However, there is little information available that describes how a latent print deposit changes with time. Thus, a more thorough understanding of these transformations would allow forensic scientists to develop specific reagents for visualizing compounds known to be stable for long periods of time.

Skin Anatomy

Skin serves several functions, including regulation of body temperature, water retention, protection, sensation, excretion, immunity, blood reservoir, and synthesis of vitamin D (except where noted, the information in this section was obtained from Odland[1]). The skin of an average adult exceeds 2 m^2 in area; yet, in most places it is no more than 2 mm thick. While the average thickness of epidermal skin varies little over most of the body, the thickness on the palms and soles can be as much as 0.4 to 0.6 mm. The skin is usually divided into two distinct layers. The outer layer is a stratified

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