Chapter 4
A Study of Fibers and Textiles

I. Scenario: A Thread of Evidence
   A. String of murders of black youth rocked Atlanta in the 1980s.
   B. Police gathered a number of unusually shaped fibers.
   C. Fiber match to the rug was the key to conviction.

II. Introduction: Fibers are used in forensic science to create a link between crime and suspect.
   A. Direct transfer - fibers may be transferred directly from victim to suspect or suspect to victim.
   B. Secondary transfer - If a victim has fibers on his person that he picked up and then transferred to a suspect
   C. How Forensic Scientists Use Fibers
      1. Type of fiber – composition, uniqueness, and so on.
      2. Fiber color – often key to matching techniques.
      3. Number found – usually the more found the easier the match.
      4. Where found – can you place the suspect at the scene?
      5. Textile fiber originated from – carpet, upholstery, car, and so forth.
      6. Multiple fibers – several types of fibers can be more conclusive.
      7. Type of crime – can be the key to fiber transfer
      8. Time between crime and fiber discovery – passage of time greatly reduces the effectiveness of fiber evidence.

III. Sampling and Testing
   A. Gathering evidence
      1. special vacuums
      2. sticky tape
      3. tweezers
   B. Analysis
      1. Nondestructive
         a. polarizing light microscopy
         b. infrared spectroscopy.
      2. Destructive
         a. burning
         b. dissolving in solvents

IV. Fiber and Textile Evidence
   A. Fiber classification
      1. Natural
         a. Animal
            i. fur
            ii. hair
            iii. silk
         b. Plant fibers
            i. seed fibers, example: cotton
ii. fruit fibers. example: coir  
iii. stem fibers, example: hemp  
iv. leaf fibers, example manila  
c. Mineral fibers or asbestos

2. Man-made fibers include rayon, acetate, nylon, acrylucs, and polyesters
   a. Regenerated fibers  
      i. derived from cellulose  
      ii. mostly plant in origin  
      iii. example: rayon  
b. Synthetic polymer fibers  
      i. petroleum products  
      ii. non-cellulose based fibers  
      iii. polyester, nylon, acrylic, olefins

3. Comparison of natural and synthetic fibers  
   a. under magnification, all synthetic fibers have very regular diameters.  
   b. hairs have cuticles

V. Yarns - Fibers too short to be used to make textiles in their raw state may be spun together to make yarns.  
   A. Any given yarn will have a direction of twist.  
   b. Forensic scientists will identify the twist direction as part of their identification.

VI. Textiles  
   A. Weave pattern  
      1. warp & weft  
      2. pattern determined by number of threads jumped as weave over and under  
   B. Thread count = The number of threads that are packed together for any given amount of fabric

VII. Summary
VIII. Case Studies
   A. The murder of George Marsh (1912)  
   B. Roger Payne (1968 U.K.)  
   C. John Joubert (1983 Nebraska)

IX. Careers in Forensics  
   A. Irene Good _ textile expert
X. Chapter Review