

# Forensic Evidence

|   |           |
|---|-----------|
| <b>CHAPTER 1. INTRODUCTION</b>                                | <b>1</b>  |
| Theory of the case  | 1         |
| <i>Figure 1 - Theory of case model</i>                        | 2         |
| Basic principles  | 3         |
| <i>A practical example</i>                                    | 4         |
| Qualification of expert witnesses                             | 5         |
| Availability of expert witnesses                              | 5         |
| <b>CHAPTER 2. BLOOD - IDENTIFICATION AND CHARACTERISATION</b> | <b>6</b>  |
| History and background  | 6         |
| Blood typing principles                                       | 6         |
| <i>Table 1 - Blood groups and parentage</i>                   | 7         |
| <i>Table 2 - Ethnic variation in blood groups</i>             | 7         |
| <i>Practical example</i>                                      | 8         |
| What is blood?  | 8         |
| <i>Table 3 - Blood groups, antibodies and antigens</i>        | 9         |
| Forensic analysis   | 9         |
| <i>Is it blood?</i>   | 9         |
| <i>Is it human blood?</i>                                     | 9         |
| <i>Individualisation</i>                                      | 10        |
| <i>DNA fingerprinting</i>                                     | 10        |
| <b>CHAPTER 3. BLOOD SPLATTER AND BLOOD STAINS</b>             | <b>12</b> |
| Introduction  | 12        |
| <i>Drops</i>  | 13        |
| <i>Splashes</i>   | 13        |
| <i>Spurts</i>   | 13        |
| <i>Pools</i>  | 14        |
| <i>Smears</i>   | 14        |
| <i>Trails</i>   | 14        |
| Angle of impact   | 14        |
| Cast-off patterns   | 14        |
| Back splatter / forward splatter                              | 15        |
| Suck-back effect  | 15        |
| <b>CHAPTER 4. FIREARMS</b>                                    | <b>16</b> |
| Introduction  | 16        |
| Individualisation   | 16        |
| Definitions - Arms Act  | 17        |
| <i>Airgun</i>   | 17        |
| <i>Antique firearm</i>  | 17        |
| <i>Firearm</i>  | 17        |

|  |           |
|--|-----------|
| <i>Imitation firearm</i>   | 18        |
| <i>Kea gun</i>   | 18        |
| <i>Military style semi-automatic firearm</i>                           | 18        |
| <i>Pistol</i>  | 18        |
| <i>Sporting configuration</i>  | 18        |
| Firearms' identification   | 19        |
| <i>Impressed and striated marks</i>                                    | 19        |
| <i>Class and individual characteristics</i>                            | 19        |
| <i>Calibre and gauge</i>   | 20        |
| <i>Table 4 - Common calibres</i>                                       | 21        |
| <i>Ammunition</i>  | 22        |
| <i>Table 5 - Shotgun pellet sizes</i>                                  | 23        |
| <i>Head stamps</i>   | 24        |
| Related topics   | 24        |
| <i>Unintentional discharge</i>   | 24        |
| <i>Firing distance determination</i>                                   | 25        |
| <i>Propellant residue patterns</i>                                     | 25        |
| <i>Firearm discharge residues</i>                                      | 26        |
| Wound examinations   | 27        |
| Action types   | 28        |
| <i>Hinged frame and top break</i>                                      | 28        |
| <i>Bolt action</i>   | 28        |
| <i>Lever action</i>  | 28        |
| <i>Revolver</i>  | 28        |
| Glossary   | 28        |
| Illustrations  | 32        |
| <i>Figure 2 - Rifles - actions and parts</i>                           | 32        |
| <i>Figure 3 - Shotguns - Actions and Parts</i>                         | 33        |
| <i>Figure 4 - Handguns - actions and parts</i>                         | 34        |
| <i>Figure 5 - Common cartridge types</i>                               | 35        |
| <i>Figure 6 - Comparison of breech face and firing pin impressions</i> | 36        |
| <i>Figure 7 - Comparison of lead projectiles</i>                       | 37        |
| <i>Figure 8 - Propellant residues and pellet patterns</i>              | 38        |
| <i>Figure 9 - Propellant residue patterns - handgun</i>                | 39        |
| <i>Figure 10 - Cartridge headstamps</i>                                | 40        |
| <b>CHAPTER 5. FINGERPRINTS</b>   | <b>41</b> |
| History  | 41        |
| Fingerprint identification in New Zealand                              | 42        |
| Physiology of fingerprints   | 43        |
| <i>Figure 11 - Structure of skin</i>                                   | 43        |
| Fingerprint classification and identification                          | 44        |

|  |           |
|--|-----------|
| <i>Class characteristics</i>   | 44        |
| <i>Fingerprint pattern classification</i>  | 44        |
| <i>Figure 12 - Basic fingerprint classification patterns and characteristics</i> | 45        |
| <i>Fingerprint identification</i>  | 46        |
| <i>Figure 13 - Types of fingerprint patterns</i>                                 | 46        |
| <i>Figure 14 - Minutiae characteristics</i>                                      | 47        |
| <i>Table 6 - International fingerprint identification standards</i>              | 48        |
| <i>Latent fingerprints</i>   | 49        |
| <i>Fingerprint detection and enhancement</i>                                     | 50        |
| <i>Human skin</i>  | 51        |
| <i>Recording of fingerprint evidence</i>   | 51        |
| <i>Age estimation</i>  | 51        |
| <i>Table 7 - Average lifetime of latent fingerprints</i>                         | 52        |
| <i>Forged and fabricated fingerprints</i>  | 53        |
| <i>Forged fingerprints</i>   | 53        |
| <i>Fabricated fingerprint evidence</i>   | 54        |
| <i>Figure 15 - Basic and composite characteristics (minutiae)</i>                | 55        |
| <b>CHAPTER 6. INTERPRETATION OF SCIENTIFIC EVIDENCE</b>                          | <b>56</b> |
| <b>CHAPTER 7. SOURCES</b>  | <b>57</b> |