Key Concepts of Chapter 8:

General Types of Patterns

- 3 general types of patterns
  - Arches
  - Loops
  - Whorls
- Primary groups are sub-divided into 8 smaller groups
- Fingerprint patterns used in classification appear on bulb portion of distal end of fingers and thumbs

General Types of Patterns

- Arches
  - 5% of all fingerprint patterns
  - 2 types of arches
    - Plain
    - Tented
  - Basic pattern
    - Ridges enter from one side of finger, rise in center, and flow out the other side
- Loops
  - 60-65% of all fingerprint patterns (most common)
  - 2 types of loops
    - Ulnar
    - Radial
  - Important to determine which hand loop appears on
  - Loop patterns from unknown hands are divided into right slope and left slope loops
  - 3 basic characteristics
    - sufficient recurve
    - one delta
    - ridge count across a looping ridge
- Whorls
  - 35% of fingerprint pattern
  - 4 sub-divisions
    - Plain whorl
    - Central pocket loop whorl
    - Double loop whorl
    - Accidental whorl
  - All whorls have at least 2 deltas with a recurve in front of each delta
Classification Terminology

- Core
  - Center of pattern area

- Delta
  - Point on a ridge at or in front of and nearest the center of where type lines diverge or separate
  - Surrounded or tends to surround pattern area

- Type-Lines
  - 2 innermost ridges that run parallel and diverge or separate and surround pattern area

- Ridge Count
  - On loop formations, the number of ridges between core and delta
  - Each ridge that touches an imaginary straight line leading from delta to core is counted
  - Core and delta are not counted

- Whorl Tracing
  - Follow first ridge below the left delta to point closest to right delta
  - If ridge ends, drop to the next ridge and continue tracing
  - Inner tracing – ridge ends 3 or more ridges above right delta
  - Outer tracing - ridge ends 3 or more ridges below right delta
  - Meeting tracing – ridge is within 2 ridges of either side of the right delta

Definitions ~ Pattern Sub-divisions

- Plain Arches
  - Ridges enter on one side of impression and flow or tend to flow out the other with a rise or wave in center

- Tented Arches
  - Most of ridges enter on one side of the impression and flow or tend to flow out other side
  - However, ridge or ridges at center do not
  - Ridges at center may form:
    - Definite angle of 90 degrees or less
    - An up thrust
    - Tented arch may have any combination of 3 basic requirements of the loop, but lack the third

- Right Slope Loop
  - Loop must have a delta, a core, and a ridge count across a looping ridge

- Right Side Loop
  - Ridges enter from right side, recurve, or loop and exit to right
    - Right hand – ulnar loop
    - Left hand – radial loop

- Left Side Loop
• Loop must have a delta, a core, and a ridge count across a looping ridge
• Ridges enter from left side, recurve, or loop and exit to left
  o Right hand – radial loop
  o Left hand – ulnar loop

- Plain Whorl
  • Consists of 1 or more ridges that make a complete circuit, with 2 deltas
  • Lines drawn between deltas cross or touch at least 1 recurving ridge within inner pattern area

- Central Pocket Loop Whorl
  • Consists of 2 deltas and at least 1 ridge
  • Makes or tends to make complete circuit
  • Line drawn between deltas would not touch or cross any recurving ridges within pattern area

- Double Loop Whorl
  • Consists of 2 separate loop formations, with 2 separate and distinct sets of shoulders, and 2 deltas

- Accidental Whorl
  • Consists of a combination of 2 different types of patterns with 2 or more deltas
    o Exception: plain arch
  • May alternately possesses some of the requirements for 2 or more different types
  • May alternately possess a pattern that conforms to none of the definitions

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**Key Concepts of Chapter 10:**

**Introduction**
- Henry System of Classification used for most of 20th Century in U.S. and most English speaking countries
  • Named after Sir Edward Henry of England
  • Developed system during late 1800s and early 1900s

- National Crime Information Center (NCIC) Classification System
  • Computerized database used in U.S.
  • Allows law enforcement agencies nationwide access to wanted bulletins and warrants for outstanding suspects and fugitives

- NCIC Classification System
  • Short cut to Henry System for quick evaluation and possible elimination of individuals as suspects
  • Further investigation required for individuals that match NCIC classification including a full fingerprint search

- Both classification systems based on 10 fingers
- Automation of fingerprint files will render manual classification filing systems obsolete
Knowledge of fingerprint patterns and anatomy of hand useful and valuable information for fingerprint examiner

Fingerprint classification not the same as fingerprint identification

Classification uses class characteristics to group like fingerprints for filing and retrieval
- Many people have same fingerprint classification

Fingerprint identification uses individual characteristics to individualize a print to a specific person

Fingerprint Classification
- Fingerprint classification of suspect may appear on wanted bulletins and arrest warrants
- Law enforcement can use information as a screening tool to eliminate persons being sought
  - Classifications that are quite different could be used to exclude suspected individuals
  - Classifications that are similar or match would be submitted to agency holding warrant to compare to actual fingerprints

The Henry System of Classification
- Blocking Out the Fingerprint Card
  - Determine pattern type in each finger block
  - Indicate pattern using symbols at the bottom middle or right side of each finger box on fingerprint card
    - Plain Arch → A
    - Tented Arch → T
    - Ulnar Loop → / in direction of the loop
    - Radial Loop → R
    - All Whorls → W
  - Index finger boxes
    - Use capital letter of pattern type, except for ulnar loop
    - Ulnar loops designated by a diagonal line slanting in the direction of loop
  - All other finger boxes
    - Use small letter to indicate pattern type, except for ulnar loop (same as above)

The Henry System of Classification
- Loop type patterns
  - Place ridge count in top right hand corner of finger box
- Whorl patterns
  - Indicate type in upper right corner of finger box
    - P – plain
    - C – central pocket
    - Small d – double loop
    - X – accidental whorl
* Indicate tracing (I, M, O) next to letter designating whorl pattern in top right corner of finger box

**Six Divisions of FP Classification**

- **Primary**
  - Only whorl patterns have value
    - Finger #1 and #2 → 6
    - Finger #3 and #4 → 8
    - Finger #5 and #6 → 4
    - Finger #7 and #8 → 2
    - Finger #9 and #10 → 1
  - Whorl values for odd number fingers are added up, plus 1 for the total denominator
  - Whorl values for even number fingers are added up, plus 1 for the total numerator
  - Primary reported as a fraction
    - Total numerator (top, even numbered boxes) over the denominator (bottom, odd numbered boxes)
  - Primary = 1 indicates no whorl patterns
  - Primary = 32 and over indicates all whorl patterns
  - Total of 1,024 possible primary classifications

- **Secondary**
  - Indicated in fraction form
    - Capital letter of pattern type for right index (#2) over left index (#7) fingers
  - U – ulnar loops
  - Example: W/U indicates right index finger is whorl, and left index finger is ulnar loop

- **Small Letter Group Secondary**
  - Applies to fingerprint cards that have a plain arch, tented arch, or radial loop
  - Excludes index fingers
  - Location of plain arch, tented arch or radial loops by small letter a, t, or r indicated to right or left of secondary
  - Example: small letter a to the left of the top capital letter of the secondary indicates that a plain arch is in right thumb
  - Dashes used to indicate position of fingers not containing a plain arch, tented arch or radial loop in the middle, ring or little fingers to the left of the secondary
    - Example: - a in the denominator (lower) line of the fraction to the right of the capital letter secondary indicate a plain arch in left little finger

- **Sub-secondary**
  - Value of ridge counts or tracings of right index (2), right middle (3), and right ring (4) fingers over the values of the left index (7), left middle (8), and left ring (9) fingers
  - Print cards with small letter groups do not need to add the sub-secondary or major divisions to the classification formula
- **Key**
  - Ridge count of first loop, excluding little fingers

- **Major**
  - Value of ridge counts or tracings of right and left thumbs

- **Final**
  - Ridge count of loop in right little finger (5)
    - If right little finger #5 is not a loop, use left little finger #10
    - If finger #10 is not a loop then there is no final value

- **VALUES TABLE FOR LOOP RIDGE COUNT CONVERSIONS**
  - Index fingers 1-9 = I; 10 or more = O
  - Middle fingers 1-10 = I; 11 or more = O
  - Ring fingers 1-13 = I; 14 or more = O
  - Right thumb 1-11 = S; 12-16 = M; 17 or more = L
    - when the left thumb ridge count is 16 or less
  - Right thumb 1-17 = S; 18-22 = M; 23 or more = L
    - when the left thumb ridge count is 17 or more
  - Left thumb 1-11 = S; 12-16 = M; 17 or more = L

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**The NCIC Classification System**
- Two letter or number codes used to identify fingerprint pattern type
  - Plain arch → AA
  - Tented arch → TT
  - Ulnar loop → ridge count
  - Radial loop → ridge count plus 50
  - Plain whorl → P, plus the tracing I, M, or O

- Two letter or number codes
  - Central Pocket → loop C, plus the tracing I, M, or O
  - Double loop whorl → small d plus tracing I, M, or O
  - Accidental → X, plus the tracing I, M, or O
  - Missing finger → XX
  - Scar or mutilation → SR

- Fingers listed in order of finger numbers on a ten-finger fingerprint card
  - Right thumb is number 1
  - Example: A5612CIPM dM661415XX
  - Classification placed in twenty small boxes that appear just above the fingerprint boxes

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**REFERENCE**