



Fingerprints



I. Fundamental Principles of Fingerprints

A. **First Principle**: It is an **individual characteristic** – no two fingerprints are alike

1. Fingerprint is determined by its ridge characteristics
2. **Ridge Characteristics** – Ridge endings, bifurcations, enclosures and other ridge details, which must match in two fingerprints in order for their common origin to be established.
3. It is the identity, number and relative location of these characteristics that make a fingerprint an individual.
4. Point by point comparison: 8-16 points (average fingerprint has @ 150 indiv. r.c.)
5. Most prints at crime scenes are **partials**.

B. **Second Principle**: A fingerprint will remain **unchanged** during a person's lifetime

1. Ridges found on underside of fingers, toes, palms and soles of feet.
2. Boundary between dermis and epidermis determines pattern of ridges.

C. **Third Principle**: Fingerprints have general ridge patterns that permit them to be systematically classified

1. Divided into three classes on basis of general pattern. They are:

- a. **Loops** – ridge lines enter from one side of pattern and curve around to exit from the same side of the pattern.
 - i. Ulnar Loop- loop opens towards little finger
 - ii. Radial Loop – loop opens towards thumb
- b. **Whorls** – ridge lines that are generally rounded or are circular in shape
 - i. Plain
 - ii. Central Pocket Loop
 - iii. Double Loop
 - iv. Accidental
- c. **Arches** – ridge lines enter the print from one side and exit the other
 - i. Plain

ii. Tented

II. Automated Fingerprint Identification System

AFIS uses automatic scanning devices that convert their image of a fingerprint into digital minutiae that contain data showing ridges at their points of termination (ridge endings) and the branching of ridges into two ridges (bifurcation)

1. Enter unknown (search) prints into system
2. When search complete, computer produces list of file prints that have closest correlation to search prints
3. Trained fingerprint expert makes final verification: AFIS makes no final decisions

III. Methods of Detecting Fingerprints

A. Types of Prints

1. **Latent** – “invisible” print made by the deposit of oils and/or perspiration.
2. **Visible** – made when finger deposits a visible material such as ink, dirt or blood on a surface
3. **Plastic** – fingerprint impressed in a soft surface

B. Detecting latent print depends on surfaces:

1. **Non-porous surfaces** such as glass, metal, or tile uses:
 - a. **Powders** – when applied lightly to nonabsorbent surface will readily adhere to perspiration and body oils left on surface
 - b. **Super Glue® Fuming** – Expose nonporous surface to cyanoacrylate fumes within an enclosed chamber
2. **Porous surfaces** such as paper, cardboard or cloth uses:
 - a. **Iodine Fuming** – suspect material placed in enclosed chamber with iodine crystals
 - i. Iodine fumes combine with fatty oils
 - ii. Are not permanent, therefore must be photographed immediately or sprayed with 1% starch solution
 - b. **Ninhydrin** – sprayed on porous surface from aerosol can and reacts with amino acids in perspiration

IV. Preservation of Developed Prints

Once latent print visualized it must be perfectly preserved for future comparison and possible use in court as evidence

1. Photograph must be taken before any further attempts at preservation 1:1 scale
2. If small enough entire object should be taken; covered in cellophane to protect
3. If too large can preserve by "lifting":
 - a. Broad adhesive tape laid over print
 - b. Tape then placed on labeled card that provides good background contrast