

Name \_\_\_\_\_ Date \_\_\_\_\_ Period \_\_\_\_\_

## **Forensic Science Notes: Fingerprints**

### **Fingerprinting History**

- Alphonse Bertillon
- William Herschel
- Henry Fauld
- Francis Galton
- Dr. Juan Vucetich
- Sir Edmund Richard Henry

### **Three Principles of Fingerprints:**

First Principle:

**Figure 6-11.** Some minutiae patterns used to analyze fingerprints.

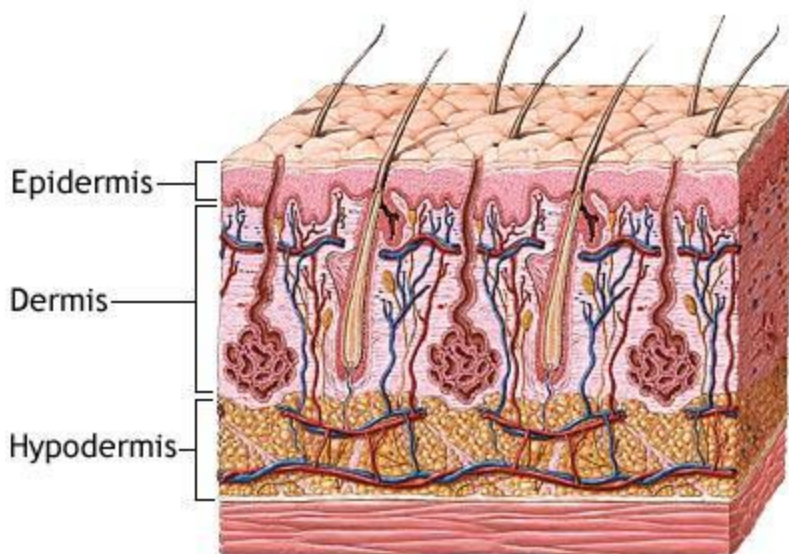
| Name                                     | Visual Appearance |
|------------------------------------------|-------------------|
| 1. Ending ridge (including broken ridge) | 1.                |
| 2. Fork (or bifurcation)                 | 2.                |
| 3. Island ridge (or short ridge)         | 3.                |
| 4. Dot (of very short ridge)             | 4.                |
| 5. Bridge                                | 5.                |
| 6. Spur (or hook)                        | 6.                |
| 7. Eye (enclosure or island)             | 7.                |
| 8. Double bifurcation                    | 8.                |
| 9. Delta                                 | 9.                |
| 10. Trifurcation                         | 10.               |

- Ridge Characteristics (Minutiae):

**Minutiae:**

Second Principle:

- Formation of Fingerprints:



ADAM.

- The three layers that compose skin are epidermis (\_\_\_\_\_ layer), dermis (\_\_\_\_\_ layer) and the shape of the dermal papillae which determine the \_\_\_\_\_ and \_\_\_\_\_ of the ridges on the surface of the skin.
- It is \_\_\_\_\_ to change ones fingerprint even though there have been numerous attempts.

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- Serious injury can leave a permanent \_\_\_\_\_. But it must penetrate \_\_\_\_\_ to \_\_\_\_\_ millimeters beneath the skins surface (damage the dermis).
- Fingerprints help provide \_\_\_\_\_ and prevent \_\_\_\_\_.
- John Dillinger:
- “Smiling Gus” Winkler:

Third Principle:

Three Classes of Fingerprints:

1. Loops:
2. Whorls:
3. Arches:



\_\_\_\_\_



\_\_\_\_\_

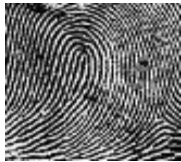


\_\_\_\_\_

### Loop Patterns:

Types:

- Ulnar



- Radial



### Whorl Patterns:



Plain whorl



Central pocket loop



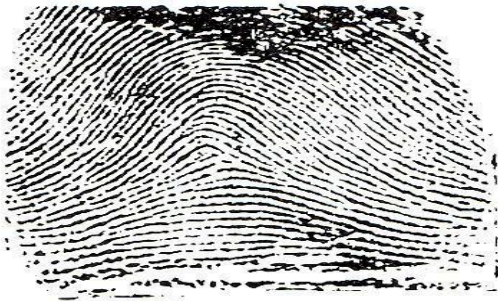
Double loop



Accidental

- Plain
- Central Pocket Loop
- Double
- Accidental

## Arch Patterns



Plain



Tented

- Plain
- Tented

## Classification of Fingerprints:

- The original Henry system converted ridge patterns on all ten fingers into a series of \_\_\_\_\_ and letters \_\_\_\_\_ in the form of a \_\_\_\_\_.
- It could only hold up to \_\_\_\_\_ sets of prints so as collections grew, it became necessary to expand the capacity of the classification system.
- In the US, the \_\_\_\_\_ expanded the classification capacity and these modifications are collectively known as the \_\_\_\_\_.

## Primary Classification:

- Using the FBI system, all fingerprint cards can be divided into \_\_\_\_\_ groups.
- The following sequence can be used to classify fingerprints:

\_\_\_\_\_

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- The presence or absence of the \_\_\_\_\_ pattern is the basis for determination of the primary classification.
- If a whorl pattern is found on any finger of the \_\_\_\_\_ pair, it is assigned a value of \_\_\_\_\_.
- On the second pair, a value of \_\_\_\_\_.
- On the third pair, a value of \_\_\_\_\_.
- On the fourth pair, a value of \_\_\_\_\_.
- On the last pair, a value of \_\_\_\_\_.
- Any finger with an \_\_\_\_\_ or \_\_\_\_\_ patterns is assigned a value of 0

Once all values are obtained, then \_\_\_\_\_ is added to the numerator and denominator.

A fingerprint classification system cannot \_\_\_\_\_ an individual, rather it provides a \_\_\_\_\_ of candidates that have similarities with the known set of prints.

The identification must always be made by a \_\_\_\_\_ visual comparison of the \_\_\_\_\_ print's and the \_\_\_\_\_ print's ridge characteristics.

### **Automated Fingerprint Identification Systems:**

AFIS:

IAFIS:

- Contains nearly \_\_\_\_\_ million fingerprint records.

### **Methods of Detecting Fingerprints**

Three types of fingerprints:

- Visible:
- Plastic:
- Latent:
  - Easiest surfaces to lift prints off of:
  - RUVIS:
  - Types of brushes to use:
  - - Colors of powders that work best:
      - How are these powders selected?

- Magna Brush

| Chemical                                   | Uses | Application | Safety                                                           | Chemical Reaction<br>(What does it react with?) | Latent Print<br>(What does it look like?) |
|--------------------------------------------|------|-------------|------------------------------------------------------------------|-------------------------------------------------|-------------------------------------------|
| Ninhydrin                                  |      |             | Do not inhale or get on your skin.                               |                                                 |                                           |
| Cyanoacrylate Vapor<br>"Super Glue Fuming" |      |             | Do not inhale or get on your skin; irritant to mucous membranes. |                                                 |                                           |
| Physical Developer<br>(Silver Nitrate)     |      |             | Wear gloves to avoid contact with skin.                          |                                                 |                                           |
| Iodine Fuming                              |      |             | Toxic to inhale or ingest.                                       |                                                 |                                           |

#### Preservation of Developed Prints:

- Once a latent print has been \_\_\_\_\_, it must be permanently preserves for future \_\_\_\_\_ and possible use in court as \_\_\_\_\_.
- Photographs must be taken \_\_\_\_\_ and after \_\_\_\_\_.
- Two procedures to follow:



- If the object is \_\_\_\_\_ enough to be transporting without \_\_\_\_\_ the print, it should preserved in it's \_\_\_\_\_. It should be covered with \_\_\_\_\_ for protection.
- Prints on large \_\_\_\_\_ objects that have been developed with a \_\_\_\_\_ can be best preserved by “\_\_\_\_\_”.
  - The most popular type of lifter is a \_\_\_\_\_ adhesive tape similar to clear adhesive tape.
  - When the powdered surface is covered with the \_\_\_\_\_ side of the tape and \_\_\_\_\_ up, the powder is \_\_\_\_\_ on the tape.
  - The tape is then placed on a properly \_\_\_\_\_ card that provides a good background \_\_\_\_\_ with the powder.

### **Digital Imaging for Fingerprint Enhancement**

- When fingerprints are lifted from a crime scene, not in \_\_\_\_\_ condition.
- Using digital imaging, fingerprints can now be \_\_\_\_\_ for the most accurate and comprehensive \_\_\_\_\_.
- Digital Imaging:

Although digital imaging is undoubtedly an effective tool for \_\_\_\_\_ and \_\_\_\_\_ images, it is only as useful as the \_\_\_\_\_ it has to work with.