

Medical Academy Named After S.I. Georgievsky Vernadsky CFU

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Group: La1 202(2)

Topic: Dermatoglyphic method of medical genetics

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Introduction to Dermatoglyph y

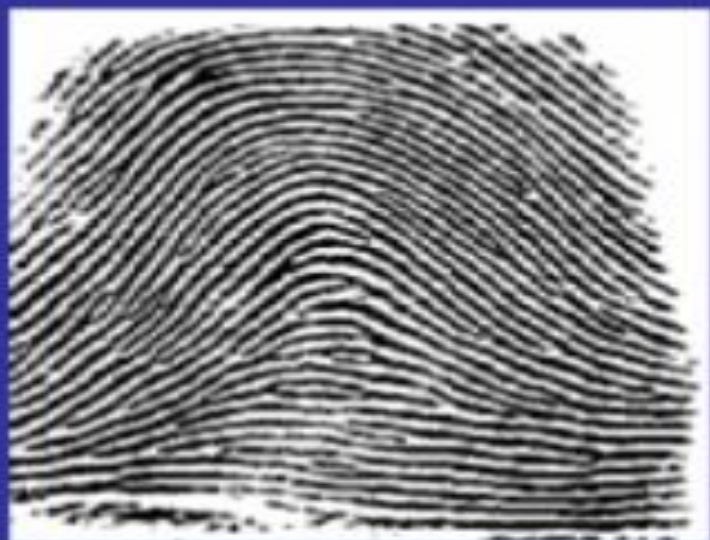
- All too often when we teach genetics we limit ourselves to the “tried and true “ single gene traits and “shy away” from more complex forms of genetic inheritance. After, all it is difficult enough to explain Mendelian Laws without the added complexity of quantitative variations. Ironically, understanding the relationship between genetic information and phenotypic expression at the organism level has more to do with the interaction of many genes than it does to any one gene in isolation. Dermal ridges are an example of a trait that shows quantitative variation, is inherited, and is easily analysed in the teaching laboratory. Further, sophisticated mathematical treatments need not be applied to teach the relationship between polygenic inheritance and expression.

Dermatoglyphics and Development

- Dermal ridges originates from fetal volar pads composed of mesenchymal tissue starting at the sixth to seventh week of development. In general, small pads produce arches and larger pads produce loops or whorls. Lateral displacement of the volar pad creates asymmetry of the pattern. Ridges become visible at about 3 months and are completed by the sixth month of prenatal development.

Fingerprinting

- A fingerprint is an **INDIVIDUAL CHARACTERISTIC**
 - no two have yet been found to possess identical ridge characteristics.



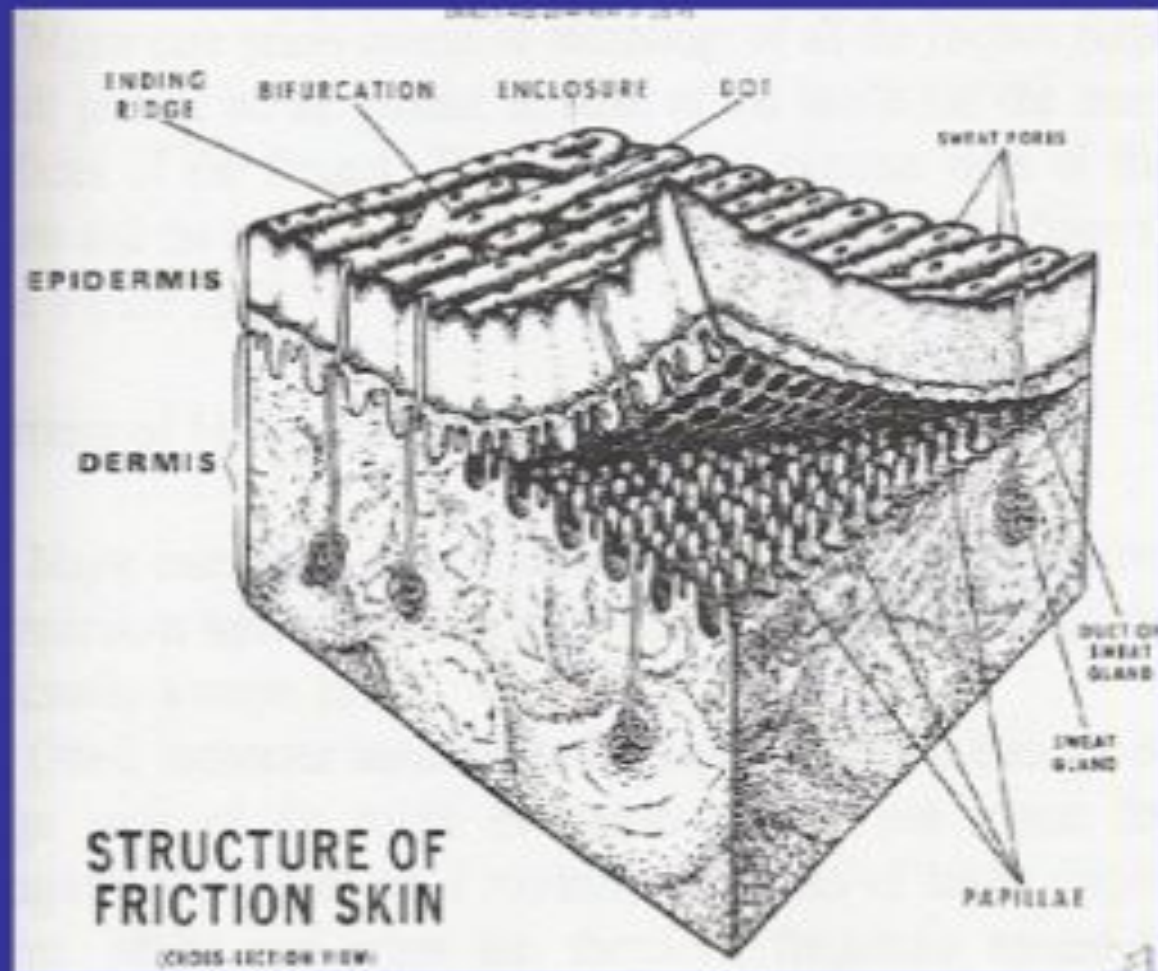
Fingerprints

- FINGERPRINTS WILL REMAIN UNCHANGED DURING AN INDIVIDUAL'S LIFETIME



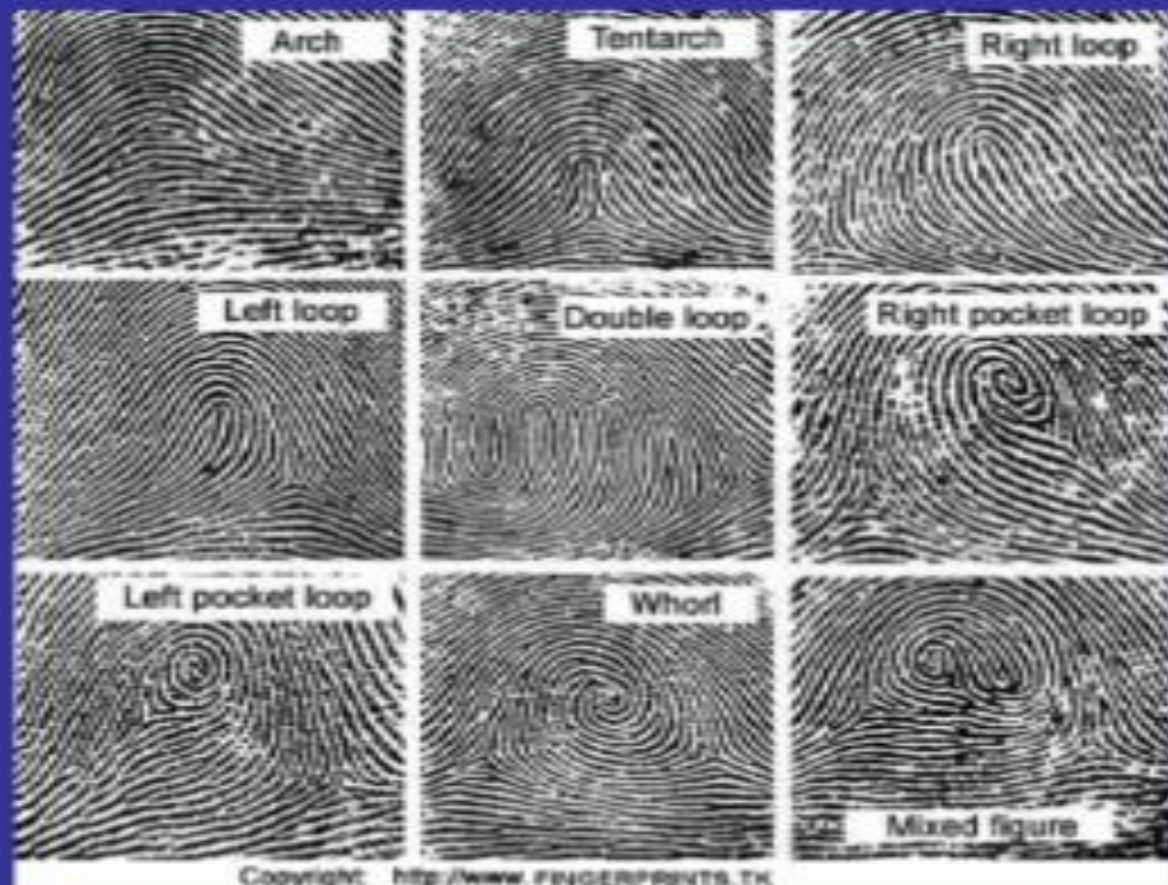
Anatomy of the Fingerprint

- Skin is composed of layers of cells:
- Epidermis (outer portion) and dermis as inner skin.
- In a cross section- a boundary of cells separating the epidermis from the dermis is made up of dermal papillae- these determine the form and pattern of ridges on the surface.
- Dermal papillae develop in the fetus and remain unchanged during life.



Dermatoglyphics

- Individuality is not determined by general shape or pattern but by a careful study of its **ridge characteristics**
 - (also called minutiae)
- Identity- number- and relative location of characteristics that impart individuality.



Sir William Herschel - 1856

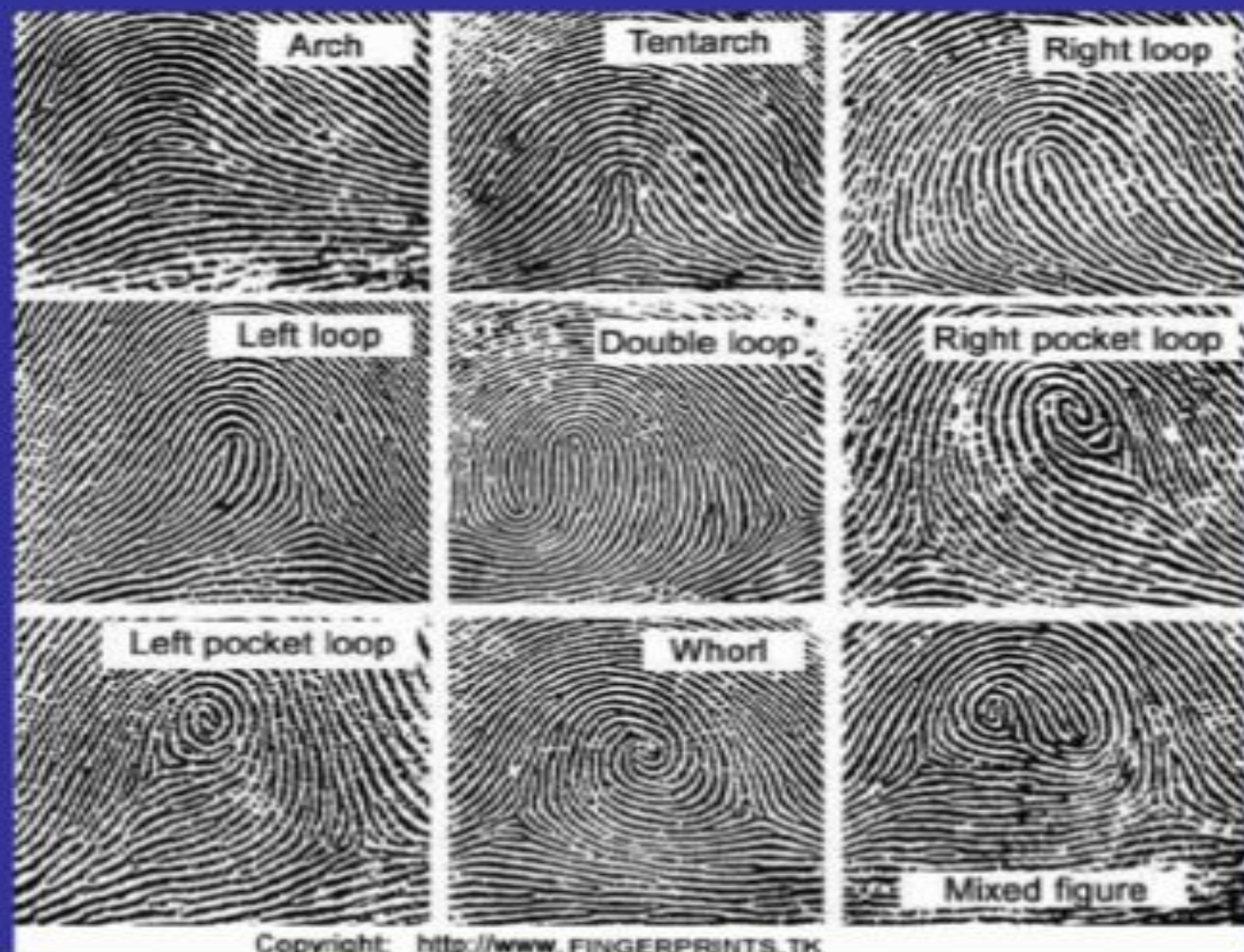
- Maybe the first to use fingerprints
- An English Chief Magistrate in India who used prints on native contracts



Sir Francis Galton - 1888

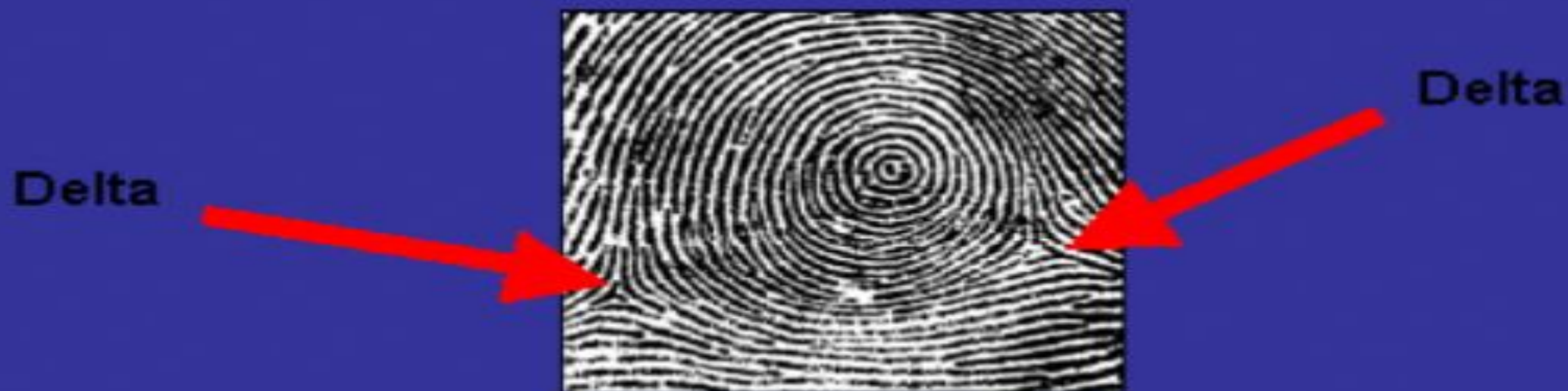
- Sir Francis Galton, a British anthropologist and a cousin of Charles Darwin, began his observations of fingerprints as a means of identification in the 1880's.
- In 1892, he published his book, "Fingerprints", establishing the individuality and permanence of fingerprints. The book included the first classification system for fingerprints.

Types of Prints



Deltas

- The ridge point nearest the type-line divergence is the DELTA.
 - Triangular in shape.
 - ALL LOOPS HAVE ONE DELTA



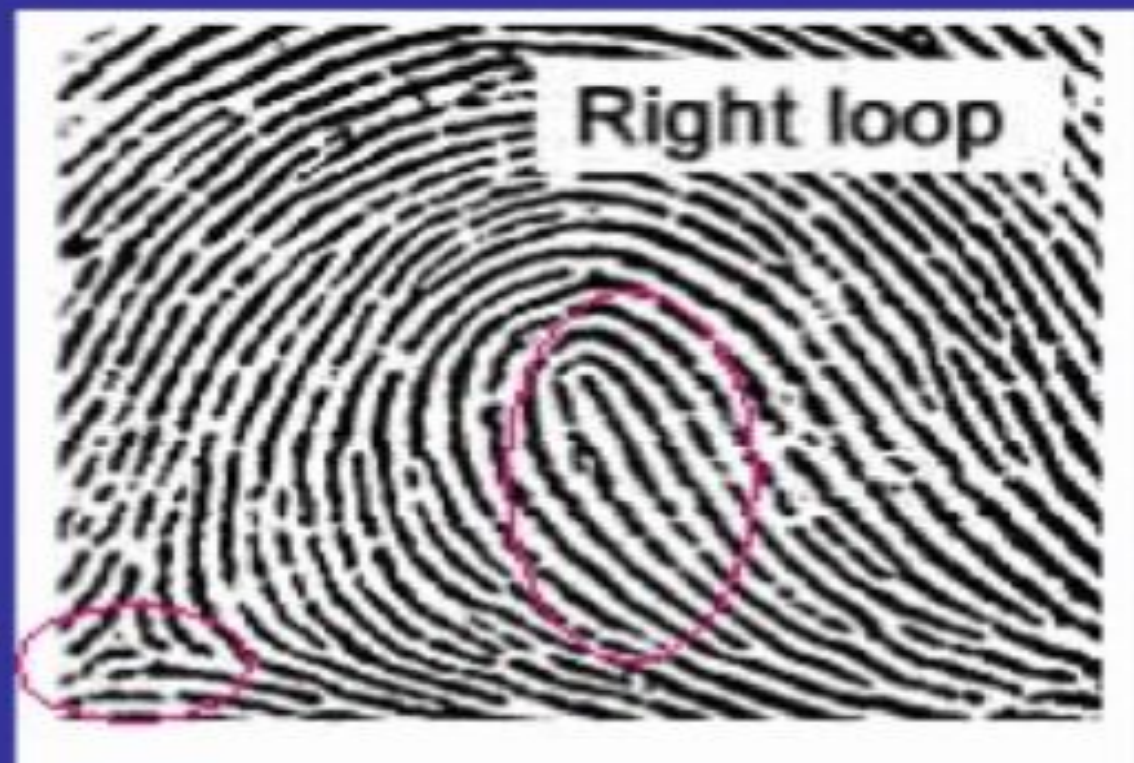
Core

Core = center of the pattern.

Core



Delta



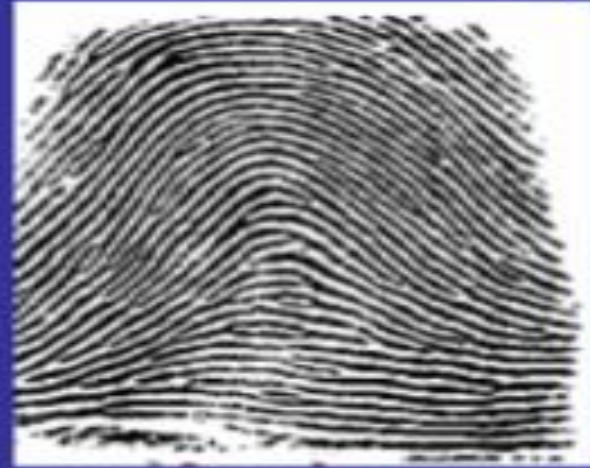
Whorls

- Whorls- 4 distinct groups:
 - Plain
 - Central pocket
 - Double loop
 - Accidental.
- All whorl patterns have type lines and a minimum of two deltas.
- Plain and central pocket loop whirl have at least one ridge that makes a complete circuit.
- Ridge may be spiral, oval or any variant of a circle



Arches

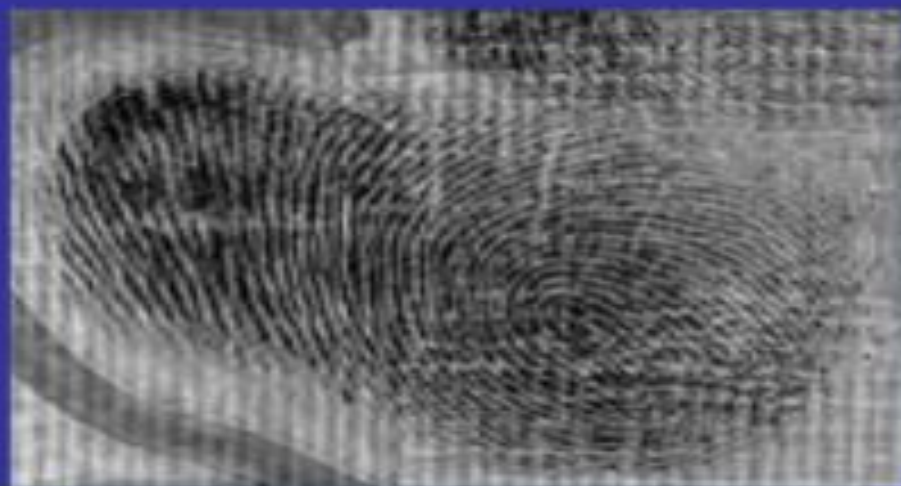
- Arches- least common has 2 patterns- plain arches and tented
- Do not have:
 - type lines
 - deltas
 - or cores



METHODS OF DETECTING FINGERPRINTS

- THE METHOD OF CHOICE WILL DEPEND ON THE SURFACE BEING LIFTED OR TESTED.
- Hard and non-absorbent surfaces (glass, mirror, tile, and painted wood) require different approaches than soft and porous- paper, cloth, or cardboard.
- The most challenging thing an examiner faces is finding the location of latent prints.

Ultraviolet Imaging Systems



Untreated Oily Print on sticky side of Duct (Duck) tape.

35mm Black and White film.

Scene Scope excels at detecting prints on surfaces that a forensic light source would find difficult or impossible.

NINHYDRIN

- The most cost effective chemical development method is Ninhydrin
- Ninhydrin is used on paper, cardboard, or other porous surfaces.
- The problem with spraying Ninhydrin solutions is that, since Ninhydrin reacts with amino acids, any exposure to your body, especially to your eyes or lungs, could have serious results. This potentially dangerous exposure is minimized by dipping or painting.



Silver Nitrate

- Silver nitrate development is based on the reaction of soluble silver nitrate with the sodium chloride (salt) that is present in most latent fingerprints to form silver chloride.
- Exposing the silver chloride to sunlight or an ultraviolet lamp causes the silver chloride to be reduced to metallic silver, making the latent prints visible as black or dark gray traces.
- Very old latent fingerprints retain it and can be developed by silver nitrate. Accordingly, silver nitrate development may work when iodine fuming and ninhydrin fail completely.
- (Note that failure of these other reagents says nothing about the age of the latent prints; even prints that are only hours or days old may respond only to silver nitrate development.)
- Silver Nitrate is destructive, so used as last resort



PRESERVATION OF DEVELOPED PRINTS

- Once visualized, it must be permanently preserved for future comparison and possible use in court as evidence.
- Camera with close-up lens
- Fixed focus to take photographs on 1:1 scale when lens is held exactly flush against the print surface to avoid distortion.
- Photograph print's relative location with other evidential items.

Permanent Record of Print

- If on small surface- transport without destroying the print
- Protect with cellophane bag
- If large surface (door, wall, etc) objects that have been developed with a powder can best be preserved by "lifting".
- Done with broad adhesive tape
- Fingerprint covered with adhesive side and pulled up, the powder will be transferred to the tape.
- Digital imaging may be used to enhance contrast, enlarge detail and compare individual points on prints to others in question.



Thank You!

